RC✳✳✳MHXGA
RC✳✳✳MHXEA

Air to Water Heat Pump Mono Outdoor Unit

installation manual

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SAMSUNG

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Safety precautions

Carefully follow the precautions listed as below because they are essential to guarantee the safety of SAMSUNG product.

WARNING

- Always disconnect a power supply of Air-Water Heat Pump before servicing it or accessing components inside the unit.
- Verify that installation and testing operations shall be performed by qualified personnel.
- To prevent serious damage on the system and injuries to users, precautions and other notices shall be observed.

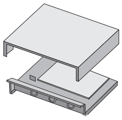
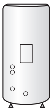
Warning

- ▶ Carefully read the content of this manual before installing the air to water heat pump and store the manual in a safe place in order to be able to use it as reference after installation.
- ▶ For maximum safety, installers should always carefully read the following warnings.
- ▶ Store the provided manual in a safe location with end user after installation, and remember to hand it over to the new owner if the Heat pump & Cylinder unit is sold or transferred.
- ▶ This manual explains how to install Air-Water Heat Pump. The use of other types of units with different control systems may damage the units and invalidate the warranty. The manufacturer shall not be responsible for damages arising from the use of non compliant units.
- ▶ The air conditioner is compliant with the requirements of the Low Voltage Directive(2006/95/EC), the EMC Directive (2004/108/EC) and the pressure equipment directive(97/23/EC).
- ▶ The manufacturer shall not be responsible for damage originating from unauthorized changes or the improper connection of electric and hydraulic lines. Failure to comply with these instructions or to comply with the requirements set forth in the "Operating limits" table, included in the manual, shall immediately invalidate the warranty.
- ▶ Failure to comply with these instructions or to comply with the requirement on the Operating Range (Heat: -20~25°C/ Cool: 10~46°C) set forth in the Product Specification (p.5) shall immediately invalidate the warranty.
- ▶ Do not use the units if you see some damages on the units and recognize something bad such as loud noisy, smell of burning.
- ▶ In order to prevent electric shocks, fires or injuries, always stop the unit, disable the protection switch and contact SAMSUNG's technical support if the unit produces smoke, if the power cable is hot or damaged or if the unit is very noisy.

- Always remember to inspect the unit, electric connections, refrigerant tubes and protections regularly. These operations shall be performed by qualified personnel only.
- The unit contains moving parts and electrical parts, which should always be kept out of the reach of children.
- Do not attempt to repair, move, alter or reinstall the unit by unauthorized personnel, these operations may cause product damage, electric shocks and fires.
- Do not place containers with liquids or other objects on the unit.
- All the materials used for the manufacture and packaging of the air to water heat pump are recyclable.
- The packing material and exhaust batteries of the remote controller(optional) must be disposed of in accordance with local regulations.
- The air to water heat pump containing a refrigerant must be disposed in authorized center or returned to retailer as special wastes.
- Wear protective gloves to unpack, move, install, and service the unit to avoid your hands being injured by the edge of the parts.
- Do not touch the internal parts (water pipes, refrigerant pipes, heat exchangers, etc) while running the units. And if you need to adjust and touch the units, have enough time for the unit can be cooled and be sure to wear protective gloves.
- In case of refrigerant leakage, try to avoid getting in contact with the refrigerant because this could result in severe wounds.
- When you install the Air to water heat pump in a small room, you must consider a proper ventilation to prevent a leakage level within the maximum permissible limit.
  - In that case, you may die from suffocation by some possibility.
- Make sure to safely dispose of packing materials. Packing materials, such as nails and other metal or wooden pallets may cause children get injured.
- Inspect the product shipped and check if damaged during transport. If the product has some damages, DO NOT INSTALL and immediately discuss about the damages with the carrier or retailer (if the installer or the authorized technician has collected the material from the retailer.)
- Our units shall be installed in compliance with the spaces described in the installation manual, to ensure accessibility from both sides and allow repairs or maintenance operations to be carried out. If the units installed without complying with procedures described in manual, additional expenses can be asked because special harnesses, ladders, scaffolding or any other elevation system for repair service will NOT be considered part of the warranty and will be charged to the end customer.
- Always make sure that the power supply is compliant with local safety standards.
- Verify that the voltage and frequency of the power supply comply with the specifications and input power is sufficient to ensure the operation of any other domestic appliance connected to the same electric lines. Always verify that the cut-off and protection switches are suitably selected.
- Always verify that electric connections (cable entry, section of leads, protections…) are compliant with the electric specifications and with the instructions provided in the wiring scheme. Always verify that all connections comply with the standards applicable to the installation of air to water heat pumps. Devices disconnected from the power supply should be completely disconnected in the condition of overvoltage category.
- Do not connect the earth wire to the gas pipe or water pipe, lighting rod, surge absorber, or telephone earth wire. If earthing is not complete, it may cause an electric shock or fire.
- Be sure to install both an earth leakage detector and circuit breaker with specified capacity in accordance with relevant local and national regulations.
  - If it is not installed properly, it may cause electric shocks and fire.
- Make sure that the condensed water runs well out of the unit at low ambient temperature. Drain pipe and cond heater can frost/ice can not grow. If drain work is not effective for releasing condensed water, it can make the units get damaged by massive ice and system can be stop , covered by ice.
- Install the power cable and communication cable of the indoor and outdoor unit at least 1m away from the electric appliance.
- Protect the unit from rats or small animals. If an animal makes a contact with the electric parts, it can cause malfunctions, smoke or fire. Please instruct the customer to keep the area around the unit clean.

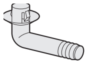
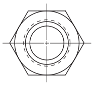
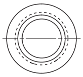
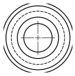
Product specifications

Product line-up

Line-up				Remark
Heat pump units	Chassis			-
	Model name	RC090MHXEA	RC120MHXEA RC120MHXGA RC140MHXEA RC140MHXGA RC160MHXEA RC160MHXGA	
Auxiliary parts	 Control kit	MIM-E03A		Requisite
	 Cylinder unit	Standard models: NH200CHXEA NH300CHXEA		Option

Accessories

- ▶ Keep supplied accessories until the installation is finished.
- ▶ Hand the installation manual over to the customer after finishing installation.
- ▶ The quantities are indicated in parentheses.

Installation manual (1)	Drain plug (1)	Fastener-nut(1)	Rubber-cover wire(2)	Drain cap (1)
				

Type	Unit	RC090MHXEA	RC120MHXEA RC120MHXGA	RC140MHXEA RC140MHXGA	RC160MHXEA RC160MHXGA
Power source	**-**	1P, 220~240VAC 50Hz	1P, 220~240VAC 50Hz 3P, 380~415VAC 50Hz	1P, 220~240VAC 50Hz 3P, 380~415VAC 50Hz	1P, 220~240VAC 50Hz 3P, 380~415VAC 50Hz
Compressor	**-**	Rotary inverter	Rotary inverter	Rotary inverter	Rotary inverter
Condenser	**-**	Brazing type 48 plates	Brazing type 72 plates	Brazing type 72 plates	Brazing type 72 plates
Evaporator	**-**	Ø7, FP 1.6, L850	Ø7, FP 1.7, L950	Ø7, FP 1.7, L950	Ø7, FP 1.7, L950
Fan & Motor	**-**	Propeller, Ø520, 3-blade BLDC Inverter	Propeller, Ø520, 3-blade BLDC Inverter	Propeller, Ø520, 3-blade BLDC Inverter	Propeller, Ø520, 3-blade BLDC Inverter
Flow switch	**LPM**	16 ± 1.5 Magnetic (decreasing)	16 ± 1.5 Magnetic (decreasing)	16 ± 1.5 Magnetic (decreasing)	16 ± 1.5 Magnetic (decreasing)
Base heater	**W**	150	150	150	150
Refrigerant	**g**	1,400 (R410A)	2,200 (R410A)	2,200 (R410A)	2,200 (R410A)
Noise (Heat/Cool, Pressure)	**dBA**	63/ 60	64/62	64 / 62	64 / 62
Water connection (In/Out)	**Inch**	1.0 / 1.0	1.0 / 1.0	1.0 / 1.0	1.0 / 1.0
Leaving water temperature	**°C**	Cooling : 5 ~ 25 Heating : 25 ~ 55	Cooling : 5 ~ 25 Heating : 25 ~ 55	Cooling : 5 ~ 25 Heating : 25 ~ 55	Cooling : 5 ~ 25 Heating : 25 ~ 55
Operating range (Heat/Cool)	**°C**	-20~35 / 10~46	-20~35 / 10~46	-20~35 / 10~46	-20~35 / 10~46
Weight (net/gross)	**Kg**	75 / 83	103 / 113	103 / 113	103 / 113
Size (WxHxD, net)	**mm**	940 x 998 x 330	940 x 1,420 x 330	940 x 1,420 x 330	940 x 1,420 x 330

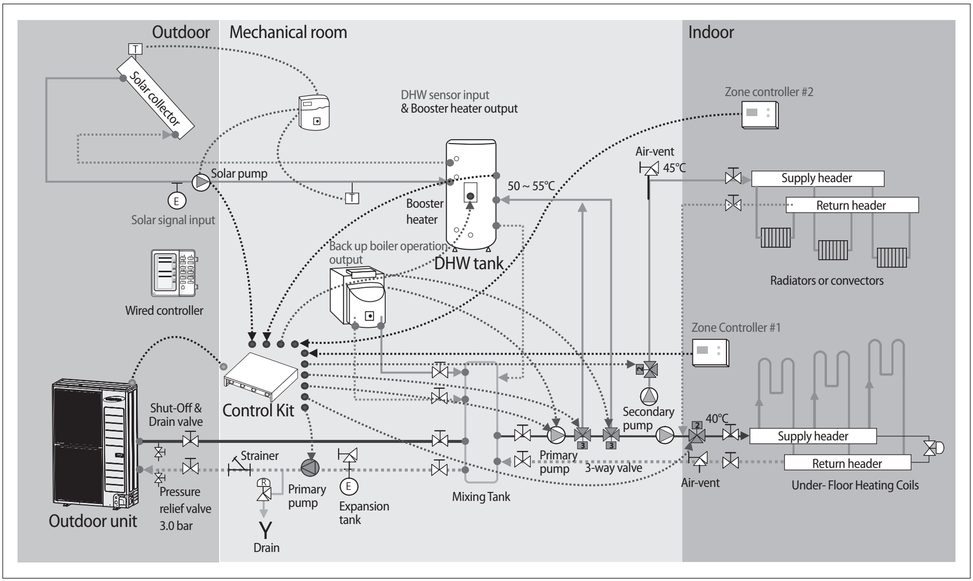
Application examples

WARNING

- The application examples given below are for illustration purposes only.
- When the SAMSUNG Air-to-Water Heat Pump system is used in series with another heat source (e.g. gas boiler), ensure that the return water temperature not exceed 55°C.
- The unit is only to be used in a closed water system. Application in an open water circuit can lead to excessive corrosion of the water piping.
- SAMSUNG can not be put responsible for incorrect or unsafe situations in the water system. Make sure that the boiler, radiators, convectors, solar collectors, UFHs, FCUs, additional pumps, pipings, and controls in the water system are in accordance with relevant local laws and regulations under the installer's responsibility.
- By-pass valve shall be installed for space heating loops. When one of loops or all loops are closed , water flow rate could be low condition. To keep flow rate approximately and prevent flow stop, the by-pass valve shall be installed between supply collector and return collector.
- SAMSUNG shall not be held liable for any damage resulting from not observing this rule.
- SAMSUNG do not provide specific water system components such as Pressure relief valve, Air vent valve, buffer tank and etc. Installers and end-users shall consider how to install the above designated components in overall water system depending on the installation conditions. If the components are not installed in appropriate location, the water system can not be operated as designed.

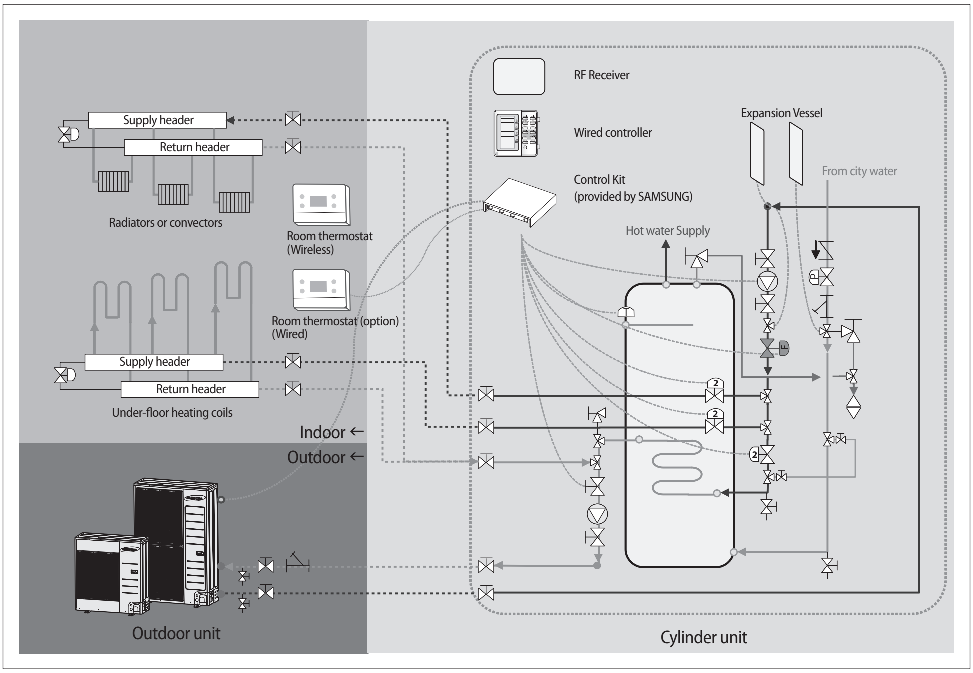
Application #1

Mono outdoor + Control kit


Outdoor
Mechanical room
Indoor
T
Solar collector
DHW sensor input
& Booster heater output
Zone controller #2
Air-vent
45°C
Supply header
Return header
Solar pump
E
Solar signal input
T
Booster
heater
50 ~ 55°C
Back up boiler operation
output
DHW tank
Radiators or convectors
Wired controller
Zone Controller #1
Control Kit
Shut-Off &
Drain valve
Secondary
pump
40°C
2
Supply header
Return header
Strainer
Primary
pump
3
3
3-way valve
Air-vent
Under- Floor Heating Coils
R
Primary
pump
E
Expansion
tank
Mixing Tank
Pressure
relief valve
3.0 bar
Outdoor unit
Drain

Application #2

Mono outdoor + Cylinder unit


Supply header
Return header
Radiators or convectors
Room thermostat
(Wireless)
Room thermostat (option)
(Wired)
Supply header
Return header
Under-floor heating coils
Indoor ←
Outdoor ←
Outdoor unit
RF Receiver
Wired controller
Control Kit
(provided by SAMSUNG)
Expansion Vessel
From city water
Hot water Supply
2
2
2
Cylinder unit

Main components

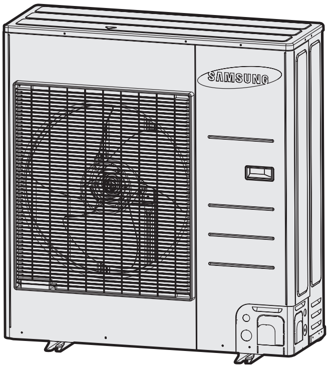
Dimensions(Overall)

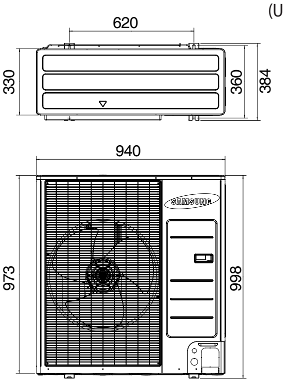
Heat pump for R410A.

1-Fan chassis

▶ RC090MHX✴

(Unit : mm)

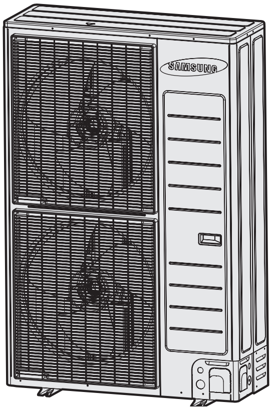


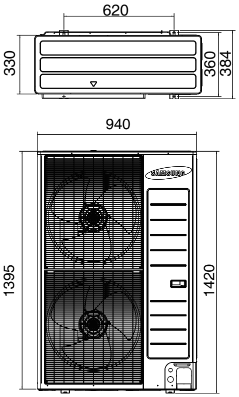

620
330
360
384
940
973
998

2-Fan chassis

▶ RC120MHX✴/RC140MHX✴/RC160MHX✴

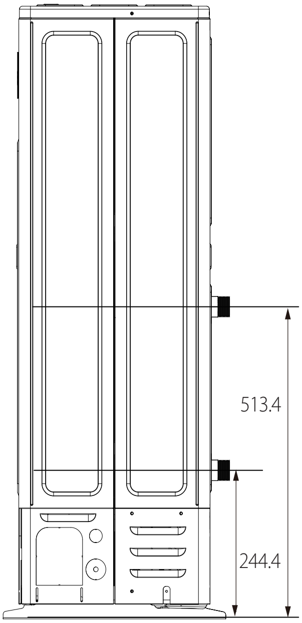
(Unit : mm)




620
330
360
384
940
1395
1420

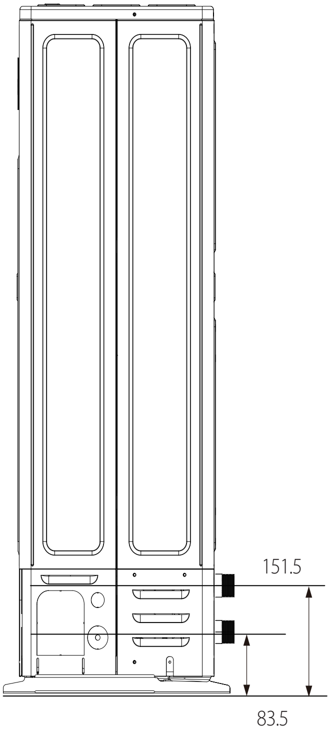
Dimensions (Water pipe)

RC090MHX✳



(Unit : mm)

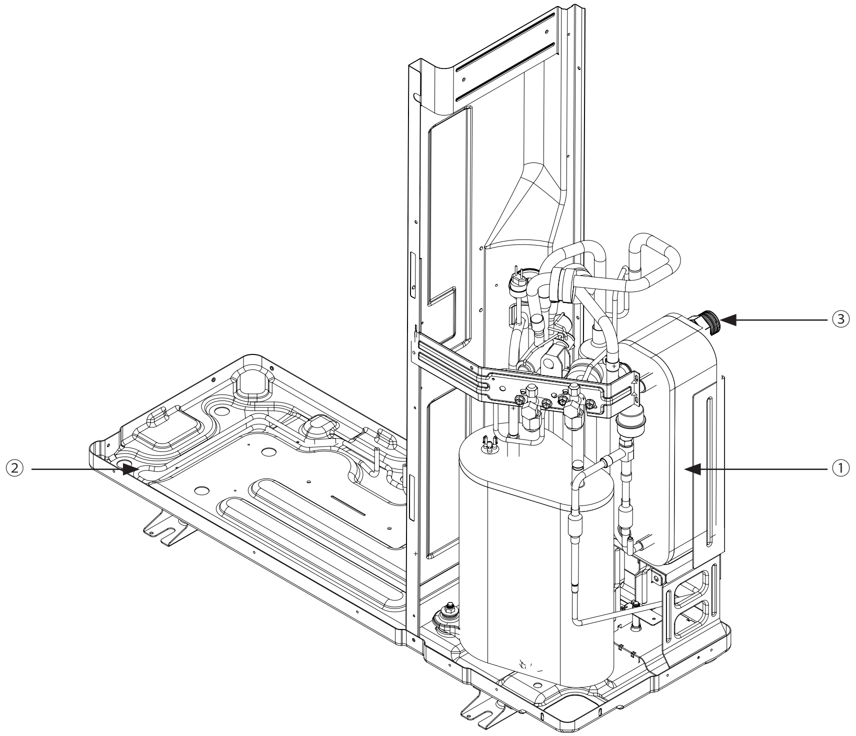
RC120MHX✳/RC140MHX✳/RC160MHX✳



(Unit : mm)

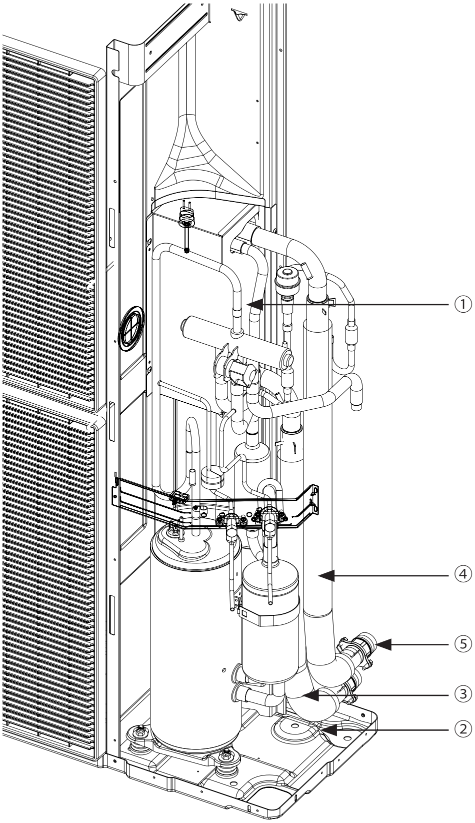
Main components

RC090✶



NO.	Name	Note.
①	PHE	48P
②	Base heater	SUS316L, 150W
③	Water fitting	BSPP 1" Male

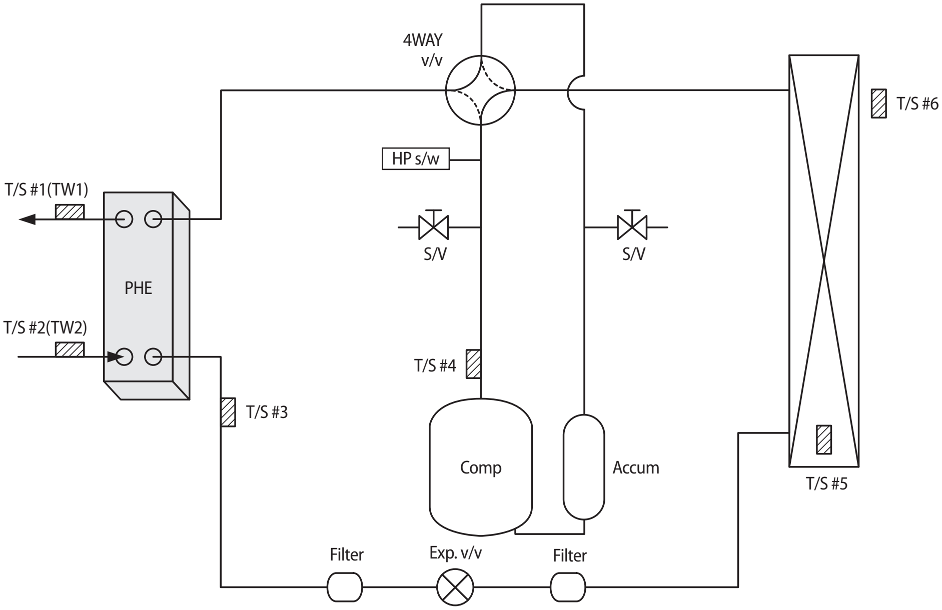
RC120✳/RC140✳/RC160✳



NO.	Name	Note.
①	PHE	72P
②	Base heater	SUS316L, 150W
③	Water hose in	Rubber hose
④	Water hose out	Rubber hose
⑤	Water fitting	BSPP 1" Male

Functional diagram

RC090MHX✳/RC120MHX✳/RC140MHX✳/RC160MHX✳


4WAY v/v
T/S #6
HP s/w
T/S #1(TW1)
S/V
S/V
PHE
T/S #2(TW2)
T/S #4
T/S #3
Comp
Accum
T/S #5
Filter
Exp. v/v
Filter

Part	Description
PHE	Plate heat exchanger
T/S #1	For water outlet temp sensor
T/S #2	For water inlet temp sensor
T/S #3	For PHE out temp
T/S #4	For discharge temp
T/S #5	For cond temp
T/S #6	For ambient temp sensor
S/V	Service valve ¼ inch
Accum	Accumulator
TW2	PHE inlet water temperature
TW1	PHE outlet water temperature

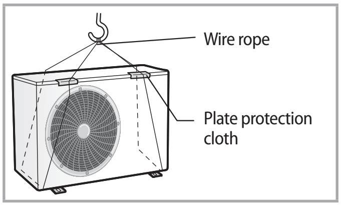
Installing the unit

Moving the outdoor unit

- Select the moving route in advance.
- Be sure that moving route is safe from weight of the outdoor unit.
- Do not slant the product more than 30˚when carrying it. (do not lay the product down sideways)
- The surface of the heat exchanger is sharp. Be carefule not to be injured while moving and installing.

Moving the outdoor unit by wire rope

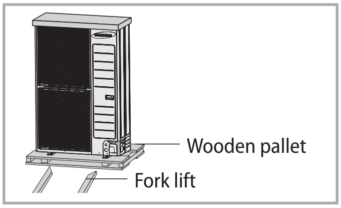
- Fasten the outdoor unit by two 8m or longer wire ropes as shown at the figure. To prevent from damage or scratches, insert a piece of cloth between the outdoor unit and rope, then move the unit.



❋ The appearance of the unit may be differ ent from the picture depending on the model.

Moving the outdoor unit with a fork lift

- Insert the fork into the wooden pallet at the bottom of the outdoor unit carefully. Be careful that the fork does not damage the outdoor unit.



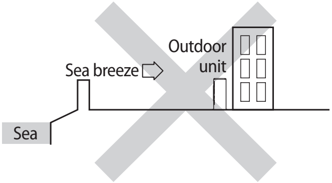
Installing the unit

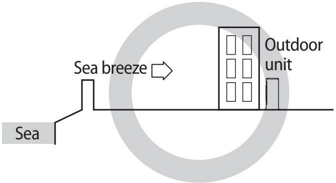
Deciding on where to install the outdoor unit

Decide the installation location regarding the following condition and obtain the user's approval.

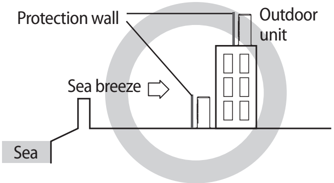
- The outdoor unit must not be placed on its side or upside down, as the compressor lubrication oil will run into the cooling circuit and seriously damage the unit.
- Choose a location that is dry and sunny, but not exposed to direct sunlight or strong winds.
- Do not block any passageways or thoroughfares.
- Choose a location where the noise of the Air to Water Heat Pump when running and the discharged air do not disturb any neighbours.
- Choose a position that enables the pipes and cables to be easily connected to the other hydrauric system.
- Install the outdoor unit on a flat, stable surface that can support its weight and does not generate any unnecessary noise and vibration.
- Position the outdoor unit so that the air flow directly stream towards the open area.
- Place the outdoor unit where there are no plants and animals because they may cause malfunction of outdoor unit.
- Maintain sufficient clearance around the outdoor unit, especially from a radio, computer, stereo system, etc.
- When installing the outdoor unit near seashore, make sure it is not directly exposed to sea breeze. If you can not find an adequate place without direct sea breeze, make sure to apply anti-corrosion coating on the heat exchanger.

- Install the outdoor unit in a place (such as near buildings etc.) where it can be prevented from sea breeze which can damage the outdoor unit.





- If you cannot avoid installing the outdoor unit by the seashore, construct a protection wall around to block the sea breeze.



- Protection wall should be constructed with a solid material such as concrete to block the sea breeze and the height and the width of the wall should be 1.5 times larger than the size of the outdoor unit. Also, secure over 700mm between the protection wall and the outdoor unit for exhausted air to ventilate.

- Install the outdoor unit in a place where water can drain smoothly.

❋ If you cannot find a place satisfying above conditions, please contact manufacturer. Make sure to clean the sea water and the dust on the outdoor unit heat exchanger.

▶ Do not install the Air to Water Heat Pump in following places.

- The place where there is mineral oil or arsenic acid. There is a chance that parts may get damaged due to burned resin. The capacity of the heat exchanger may reduce or the Air to Water Heat pump may be out of order.
- The place where corrosive gas such as sulfurous acid gas generates from the vent pipe or air outlet. The copper pipe or connection pipe may corrode and refrigerant may leak.
- The place where there is a danger of existing combustible gas, carbon fiber or flammable dust. The place where thinner or gasoline is handled.

CAUTION

Do not install the outdoor unit in a snowy and cold area (low temperature and high humidity area - where the temperature is below -7°C and humidity is higher than 85%) because according to operation condition (defrost, etc.), ice may be formed in the drain route.

If the ice is accumulated, it may cause critical damage to the product.

ex) lakeside of cold area in winter time, seashore, alpine region and etc.

CAUTION

- This device must be installed according to the national electrical rules.
- With an outdoor unit having net weight upper than 60kg, we suggest do not install it suspended on wall, but considering floor standing one.

▶ If the outdoor unit is installed at a height, ensure that its base is firmly fixed in position.

▶ Make sure that the water dripping from the drain hose runs away correctly and safely.

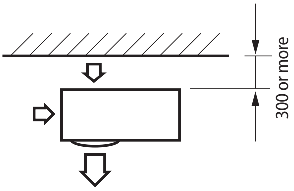
▶ When you install the outdoor unit at wayside, you should install it above 2m height or make sure that the heat from the outdoor unit shouldn't be in direct contact with passersby. (The ground for application :The revision of regulation for facility in building by the law of the Ministry of Construction and Transportation.

Installing the unit

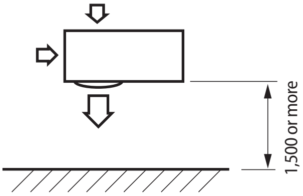
Space requirements for outdoor unit

When installing 1 outdoor unit

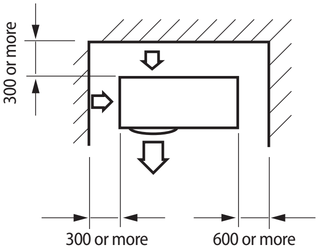
(Unit : mm)



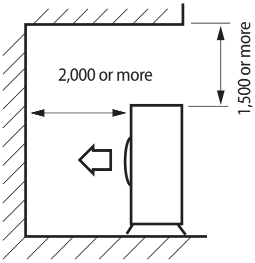
❋ When the air outlet is opposite the wall


1,500 or more

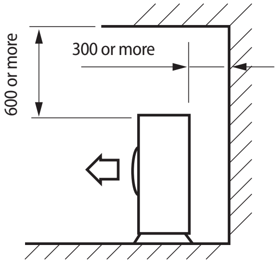
❋ When the air outlet is towards the wall


300 or more
300 or more
600 or more

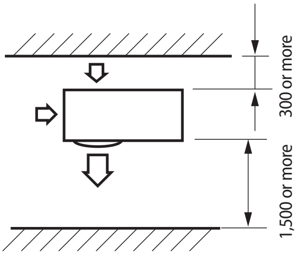
❋ When 3 sides of the outdoor unit are blocked by the wall


2,000 or more
1,500 or more

❋ The upper part of the outdoor unit and the air outlet is towards the wall


600 or more
300 or more

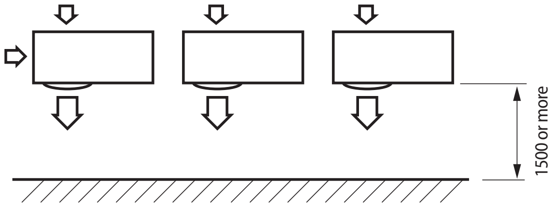
❋ The upper part of the outdoor unit and the air outlet is opposite the wall


300 or more
1,500 or more

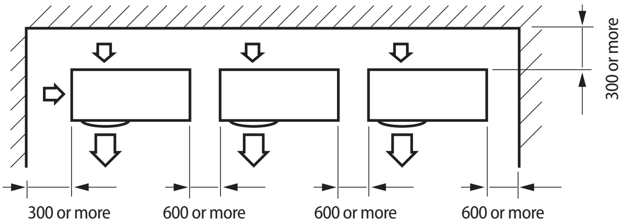
❋ When front and rear side of the outdoor unit is towards the wall

When installing more than 1 outdoor unit

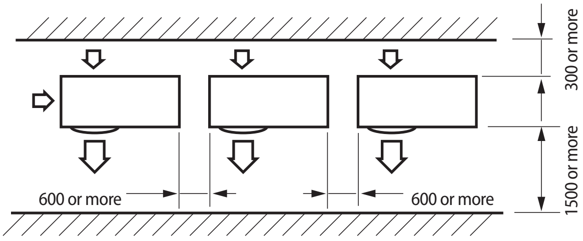
(Unit : mm)


1500 or more

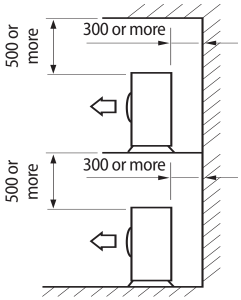
❋ When the air outlet is towards the wall


300 or more
300 or more
600 or more
600 or more
600 or more

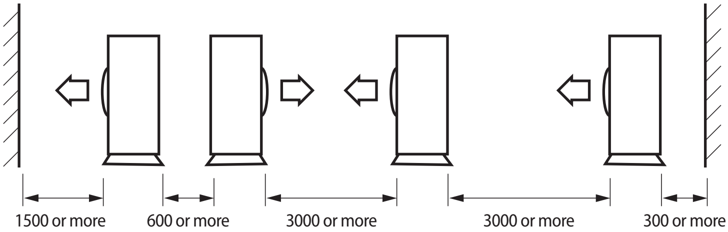
❋ When 3 sides of the outdoor unit are blocked by the wall


300 or more
1500 or more
600 or more
600 or more

❋ When front and rear side of the outdoor unit is towards the wall


500 or more
300 or more
500 or more
300 or more

❋ The upper part of the outdoor unit and the air outlet is opposite the wall


1500 or more
600 or more
3000 or more
3000 or more
300 or more

❋ When front and rear side of the outdoor unit is towards the wall

CAUTION

- The units must be installed according to distances declared, in order to permit accessibility from each side, either to guarantee correct operation of maintenance or repairing products. The unit’s parts must be reachable and removable completely under safety condition (for people or things).

Outdoor unit installation

The outdoor unit must be installed on a rigid and stable base to avoid any increase in the noise level and vibration, particularly if the outdoor unit is to be installed in a location exposed to strong winds or at a height, the unit must be fixed to an appropriate support(wall or ground).

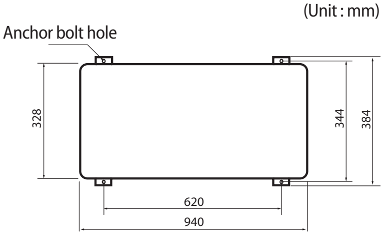
▶ Fix the outdoor unit with anchor bolts.

NOTE

- The anchor bolt must be 20mm or higher from the base surface.

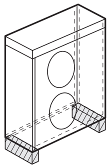
CAUTION

- When tightening the anchor bolt, tighten the rubber washer to prevent the outdoor unit bolt connection part from corroding.
- Make a drain outlet around the base for outdoor unit drainage.
- If the outdoor unit is installed on the roof, you have to check the ceiling strength and waterproof the unit.

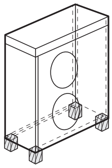


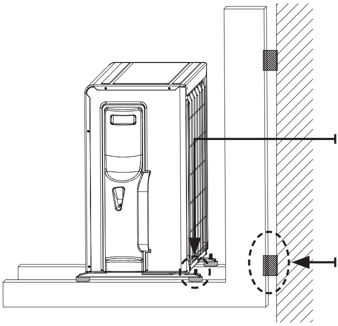
Outdoor unit support

○



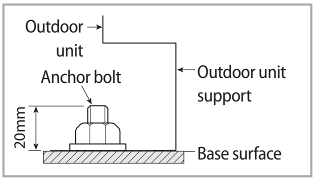
✕





Designed to cut off residual vibration from outdoor unit to rack. (not supplied with product)

Soft rubber designed to cut off vibration from rack to wall. (not supplied with product)



▶ Outdoor unit installed on the wall by rack

- Ensure the wall will be able to suspend the weight of rack and outdoor unit ;
- Install the rack close to the column as much as possible ;
- Install proper grommet in order to reduce noise and residual vibration transferred by outdoor unit towards wall.

CAUTION

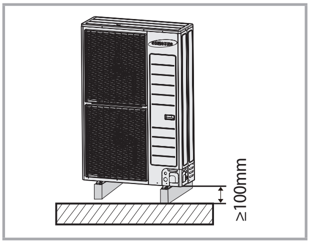
When installing air guide duct

- Check and make sure that screws do not damage the copper pipe.
- Secure air guide duct on guard fan.

Drain work

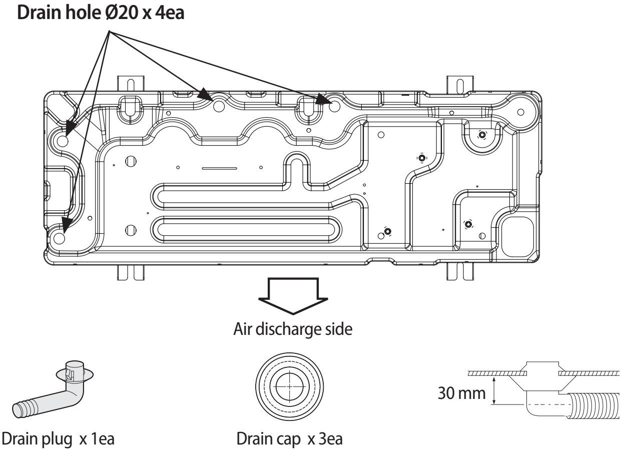
While Air-Water Heat Pump is running in heating mode, Ice can begin accumulate on the surface of condenser.
To prevent Ice from growing, system go into De-frost mode and then Ice on the surface changes to water.
Dropped water from condenser shall be eliminated through running drain holes to prevent Ice growing at low temperature.

- ▶ In case there is not enough space for drainage out of the unit, additional drain works are required. Follow the description as below
  - Make space more than 100mm between the bottom of the outdoor unit and the ground for installation of the drain hose.
  - Insert the drain plug into the hole on the bottom of the outdoor unit.
  - Connect the drain hose to the drain plug.
  - Make sure dusts or small branches should not go into the drain hose.

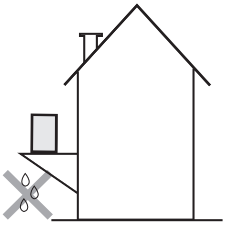


WARNING

- If drain work is not enough, it can lead to system performance degration and system damages.



1. Prepare a water drainage channel around the foundation, to drain waste water from around the unit.
2. If the water drainage of the unit is not easy, please build up the unit on a foundation of concrete blocks, etc. (the height of the foundation should be maximum 150mm).
3. If you install the unit on a frame, please install a waterproof plate within 150mm of the underside of the unit in order to prevent the invasion of water from the lower direction.
4. When installing the unit in a place frequently exposed to snow, pay special attention to elevate the foundation as high as possible.
5. If you install the unit on a building frame, please install a waterproof plate (field supply) (within 150mm of the underside of the unit) in order to avoid the drain water dripping. (See figure)



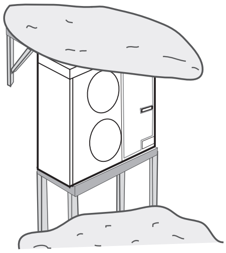
Installing the unit

Selecting a location in cold climates

NOTE

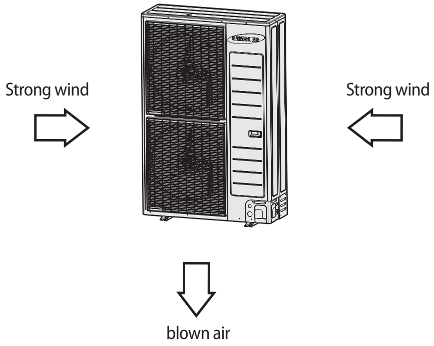
- When operating the unit in a low outdoor ambient temperature, be sure to follow the instructions described below.

- ▶ To prevent exposure to wind, install the unit with its suction side facing the wall.
- ▶ Never install the unit at a site where the suction side may be exposed directly to wind.
- ▶ To prevent exposure to wind, install a baffle plate on the air discharge side of the unit.
- ▶ In heavy snowfall areas it is very important to select an installation site where the snow will not affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (If necessary construct a lateral canopy)



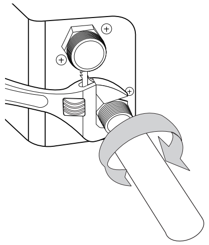
1. Construct a large canopy.
2. Construct a pedestal.
   - Install the unit high enough off the ground to prevent it being buried under snow.

- ▶ The outdoor unit should be installed with consideration of the direction of strong winds. These can make the unit turn over, so the side of the unit should be set to face the wind, not the front of the unit.



Piping work

Water connections must be made in accordance with the outlook diagram delivered with the unit, respecting the water in- and outlet. If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:



- ▶ Use clean pipes only.
- ▶ Hold the pipe end downwards when removing burrs.
- ▶ Cover the pipe end when inserting it through a wall so that no dust and dirt enter.
- ▶ Use a good thread sealant for the sealing of the connections.
  The sealing must be able to withstand the pressures and temperatures of the system.
- ▶ When using non-brass metallic piping, make sure to insulate both materials from each other to prevent galvanic corrosion.
- ▶ Because brass is a soft material, use appropriate tooling for connecting the water circuit. Inappropriate tooling will cause damage to the pipes.

CAUTION

- Be careful not to deform the unit piping by using excessive force when connecting the piping. Deformation of the piping can cause the unit to malfunction.
- Always use two wrenches (spanners) for tightening or loosening the water connections, and tighten connections with a torque wrench as specified in below table. If not, connections and parts can be damaged and leaks.
- The unit is only to be used in a closed water system. If applications are in open water circuit, it will generate Heat exchangers fouling, Corrosion, Leak.

	Name	Tightening torque	
1	BSPP1	350~380 kgf•cm	34 ~ 37 N•m
2	Flow switch	72~82 kgf•cm	7 ~ 8 N•m

Flushing and air-purging

When filling water, the following start-up procedure should be followed.

1. All system components and pipes must be tested for the presence of leaks.
2. Preparation of a make-up water assembly or flushing unit is recommended for installation and service.
3. Before connecting pipes to the hydro unit, flush water pipes clean to remove contaminants during hours using a flushing unit or tap water pressure if it is adequate (at 2 to 3 bar)
4. Fill water into the hydro unit by opening service valves.
5. Purge the air. (Fill with a flushing unit with sufficient capacity: avoid aerating the water)
6. Circulate for long enough to ensure that all air has been bled from the complete water piping system.

Flushing unit
(or purging cart)

CAUTION

- After installations, commissioning should be performed by qualified representatives. Unless flushing and air-purging works are performed adequately, it might result in malfunctions.

Piping work

CAUTION

- **Before installing/commissioning the unit, make sure to check the following points :**
  - The maximum water pressure of the unit is 2.8 bar static pressure.
  - The operating range of water temperature is 15~55˚C at heating conditions and 5~25˚C at cooling conditions.
  - The minimum required water flow for operation is 16 liters/min. At all times the required water flow-rates should remain. Otherwise, the unit can stop due to a lack of water.
  - Water quality must be according to EN directive 98/83 EC.
  - If the unit and the pipes are exposed to freezing temperature, It can cause damage to the hydraulic system. Special care must be taken to prevent freezing of the total water system.
  - The unit is designed to be used in a closed-loop system. Do not use any other components which are designed only for a open-loop system.
  - Never use Zn-coated parts in the water circuit.
  - All hydraulic parts including field piping must be insulated to reduce heat loss and condensation.
  - It is recommended to install the make-up water assembly to feed small quantities of water to the system automatically, replacing the minor water losses and maintaining the system pressure.
  - Drain taps must be provided at all low points of the system to permit complete drainage of the circuit for maintenance use.
  - Make sure that the check valves are correctly installed in the system (field supply).
  - Flush pipes out with clean water to remove contaminants in pipes during installation.
  - The strainer(water filter) must be cleaned after flushing the pipes, and it should be cleaned periodically. Replace strainer when necessary.
  - Charging : Charge the water until a pressure of 1.5~2.0bar by using make-up water assembly(Field supply). (The water pressure indicated on the manometer will vary depending on the water temperature)

    The nominal water pressure in the system should remain about 1.0 bar at all times to avoid air entering the water system.
  - Air purging; Make sure that air should be vented from the system at start-up or after installing/ servicing. The air vent valve must be opened during charging the water (at least 2 turns) in order to removeall air in the circuit, and a make-up water assembly allows water into the system continuosly.
  - In case that the water piping would be located in a higher position than the air vent of the unit, it is necessary to add an additional ones in the highest position of water circuit. The air vent should be located both where water temperatures are the highest and where the height of pipes are the highest.
  - Always use materials which are compatible with water used in the system and with the materials used on the indoor unit.
  - Select piping diameter in relation to required water flow and available ESP of the pump.
  - Use chemical cleaning agents(Begin with acid , finish with alkali).
  - Do not operate the system with closed valves because it results in damaging the heat pump.

Freeze protection

Frost can make some damage on the hydraulic system. It is because it is installed outside house nomally. To avoid taking risks of freezing problem, special cares such as Anti-freezing fluid are required as below. Ethylene glycol concentration can vary depeding on outdoor temperature where our system is installed, fill in Ethylene glycol by mixing as below.

WARNING

Ethylene Glycol Is Toxic

Ethylene glycol is toxic if swallowed, and therefore is a hazard to animals and small children.

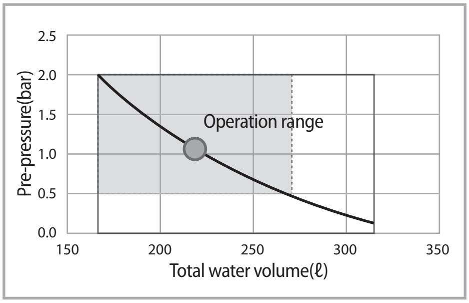
Ethylene glycol must be handled in accordance with relevant local laws and regulations.

Outdoor temperature	Ethylene Glycol(%)
23°F (–5°C)	10
14°F (–10°C)	20
5°F (–15°C)	25
–10°F (–20°C)	35

Setting capacity and pre-pressure of the expansion vessel

When it is required to change the default pre-pressure of the expansion vessel(1 bar), keep in mind the following guidelines:

- Use only dry nitrogen to set the expansion vessel pre-pressure.
- Inappropriate setting of the expansion vessel pre-pressure will lead to malfunction of the system. Therefore, the pre-pressure should only be adjusted by a licensed installer.



Installation height difference(a)	Water volume	
	< 220 Litres	> 220 Litres
<7m	No pre-pressure adjustment required.	Actions required: • Pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel". • Check if the water volume is lower than maximum allowed water volume.
>7m	Actions required: • Pre-pressure must be increased, calculate the appropriate value following by "Calculating the pre-pressure of the expansion vessel". • Check if the water volume is lower than maximum allowed water volume.	Expansion vessel of the unit too small for the installation.

(a) Installation height difference: height difference(m) between the highest point of the water circuit and the indoor unit. If the unit is located at the highest point of the installation, the installation height is considered 0m.

Calculating the pre-pressure of the expansion vessel

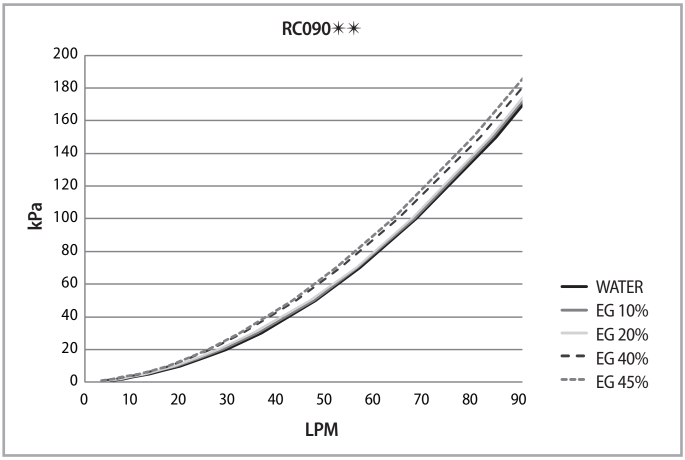
- The pre-pressure(Pg) to be set depends on the maximum installation height difference(H) and is calculated as below : Pg=(H/10+0.3) bar

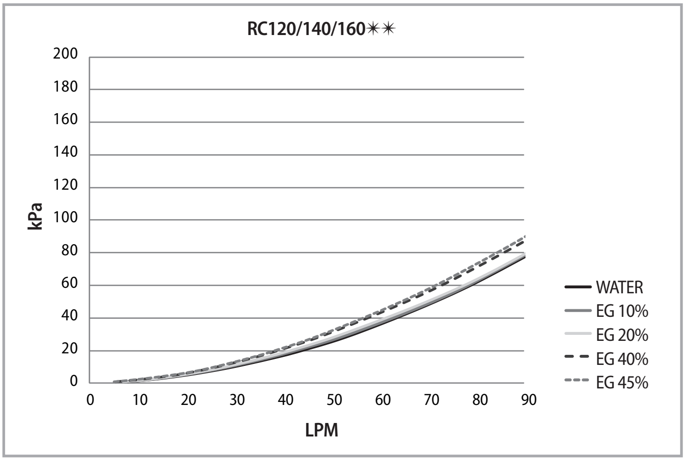
Piping work

Unit resistance and PHE resistance by glycol concentrate

The unit is composed of water pipes and PHE basically.

To ensure correct operation and predict the expected performance, Flow and Resistance table can be used and Flow and Resistance characteristic is dependent on Glycol concentration.





Changing Glycol concentration can cause the pressure drop of the system and it can leads to make flow rate rather slow. Just in case performance degration, installer shall be careful of flow rate changes.

Flow switch

Flow switch is not integrated part in MONO Unit. But the installation is essential to operate MONO Unit.

Flow switch is provided by Samsung control kit as a sub component.

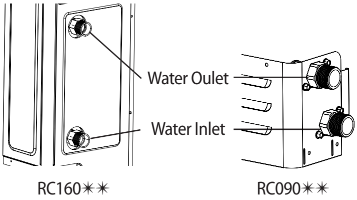
CAUTION

- Flow switch shall be installed described by installation manual of Mono unit or Control kit.
- All electric wiring works shall be implemented by manuals which Samsung provided.
- Before completing the installation works, make sure to check if the flow switch is installed in horizontal and if flow direction is in parallel with pipe direction. (Straight length of In and Out pipe of flow switch shall have 5 times length in diameter)

Charging water

After installation is completed, the following procedures shall be used to charge water into the hydro unit.

- ▶ Connect water lines to water connections of Air-Water Heat Pump.
- ▶ Air vent valve shall be open at least 2turns so that air can be eliminated in the system.
- ▶ Open the service valve in the water supply connection.
- ▶ Water pressure of supply line shall be over 2.0 bar for good charging work.
- ▶ Stop water supply when the pressure gauge of hydro unit indicates around 2.0 bar.



CAUTION

- There shall be enough space for Service works.
- Water pipe and connections shall be cleaned by using water or cleaner before operating the unit at first time.
- Considering E.S.P and water pump performance, select water plumbing specification and under floor loofs.
- Make sure to calculate the total resistance of piping system and determine the size of pipes before selecting the required head of pumps. If the pressure loss of total water system is over than designed pressure, an external water pump shall be installed on piping system in series.
- Do not connect power supply while water is charging.
- When initial installation or re-installation is required, remove air by air vent valve in water plumbings which are installed by local installers to prevent air trap in the system while charging water.
- Make sure that back flow preventer (check valves) shall be installed on main supply line to prevent from contaminating the city water.
    - It is recommended to install the make-up water assembly to prevent from contaminating the city water.
    - Check valves in the make-up water assembly can prevent running water inside hydro unit from contaminating water supplies during installation or maintenance works.

Piping work

Pressure relief valve

MONO Unit does not have a pressure relief valve. The valve shall prevents abnomal water pressure from damaging the the system by opening at 3.0 bar.

CAUTION

- Make certain that the discharged water out of drain pan does not affect other elements.

Filter / Strainer

Installation of Filter / Strainer is mandatory for water system. The Filter or Strainer shall be located in front of inlet pipe of PHE.

While operating the system, some dust and foreign materials can circulate the system and can make the whole system not work well due to blockage of heat exchangers and corrosion in some components.

Filter mesh : #30

Piping insulation

The complete water circuit, inclusive all piping, must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter time. The thickness of the sealing materials must be at least 9 mm with (0.035 W/mK) in order to prevent freezing on the outside water piping.

If the temperature is higher than 86°F (30°C) and the humidity is higher than RH 80%, then the thickness of the sealing materials should be at least 20 mm in order to avoid condensation on the surface of the sealing.

Wiring

Two electronic cables must be connected to the outdoor unit.

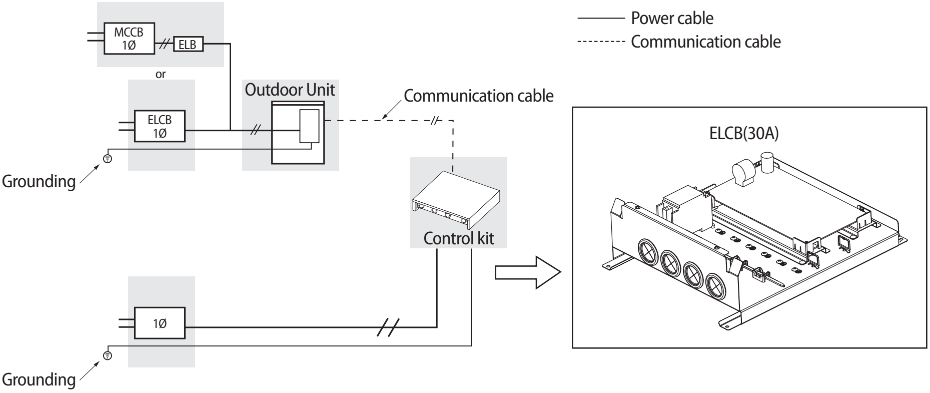
- ▶ The connection cord between indoor unit and outdoor unit.
- ▶ The power cable between outdoor unit and auxiliary circuit breaker.
- ▶ Specially for Russian and European market, before installation, the supply authority should be consulted to determine the supply system impendance to ensure compliance.

CAUTION

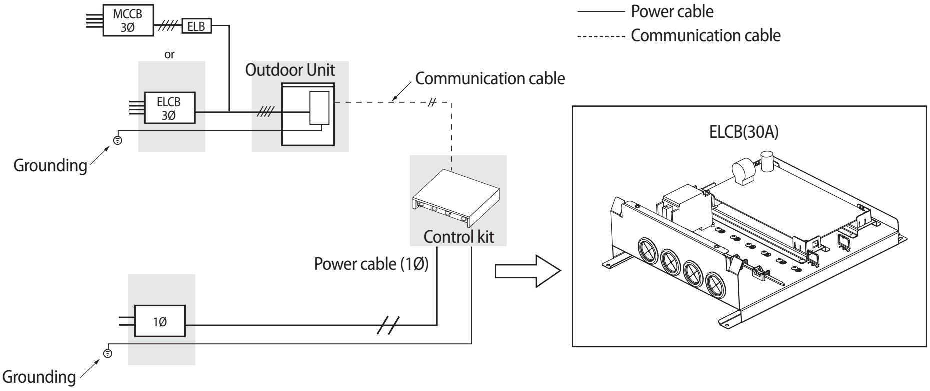
- During the unit installation make first refrigerant connections and then electrical connections. If unit is uninstalled first disconnect electrical cables, then refrigerant connections.
- Connect the air conditioner to grounding system before performing the electrical connection.
- When installing the unit, you shouldn't use inter connection wire.

Example of EHS system

When using ELB for 1 phase


MCCB
1Ø
ELB
or
ELCB
1Ø
Outdoor Unit
Communication cable
Power cable
Communication cable
ELCB(30A)
Grounding
Control kit
1Ø
Grounding

When using ELB for 3 phase 4 wires


MCCB
3Ø
ELB
or
ELCB
3Ø
Outdoor Unit
Communication cable
Power cable
Communication cable
ELCB(30A)
Grounding
Control kit
Power cable (1Ø)
1Ø
Grounding

❋ If an outdoor unit is installed in a place in danger of an electric leak or submergence, you must install the ELB.

❋ Installation of control kit must be followed its Installation manual.

Wiring

Power Cable Specifications

1 phase

Outdoor unit	Rated		Voltage Range		MCA	MFA	Fuse cut-off current
	Hz	Volts	Min	Max	Maximum Current in normal operation	MCA✳1.25 + Additional Load	Total fuse in unit
RC090MHXEA	50	220-240	198	264	22 A	27.5 A	40 A
RC120MHXEA	50	220-240	198	264	28 A	35 A	40 A
RC140MHXEA	50	220-240	198	264	30 A	37.5 A	40 A
RC160MHXEA	50	220-240	198	264	32 A	40 A	40 A

- ▶ The power cable is not supplied with air conditioner.
- ▶ Supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (Code designation IEC:60245 IEC 57 / CENELEC:H05RN-F)
- ▶ Equipment complying with EN/IEC 61000-3-12.

Indoor Unit	Load	Power supply	Power cable	MAX. length	Type GL
			mm^2,wires	m	A
MIM-E03A	No Heater (Water Pump, Valve, Wired RMC)	1Ø, 220-240V, 50Hz	1.5 / 3	<10m	10
			2.5 / 3	10m<L<20m	10
	Booster Heater (3kw)		4.0 / 3	<10m	20
			6.0 / 3	10m<L<20m	20
	Booster Heater (~3kw) + Backup Heater (~3kw)		6.0 / 3	<10m	40
			8.0 / 3	10m<L<20m	40

- ▶ The Power cable is not supplied with the heat pump.
- ▶ For power cable, use the grade H07RN-F materials in 1Ø system.
- ▶ If you connect Backup Heater at separated power cable, you can reduce wire size. (Please refer to indoor unit installation manual)

3 Phase

Outdoor unit	Rated		Voltage Range		MCA	MFA	Fuse cut-off current
	Hz	Volts	Min	Max	Maximum Current in normal operation	MCA✳1.25 + Additional Load	Total fuse in unit
RC120MHXGA	50	380-415	342	457	10 A	12.5 A	25 A
RC140MHXGA	50	380-415	342	457	11 A	13.8 A	25 A
RC160MHXGA	50	380-415	342	457	12 A	15 A	25 A

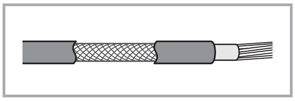
- ▶ The power cable is not supplied with air conditioner.
- ▶ Supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (Code designation IEC:60245 IEC 57 / CENELEC:H05RN-F)
- ▶ This equipment complies with IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or equal to 3.3[MVA] at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to 3.3[MVA].

Wiring

Between indoor unit and outdoor unit connection cable specifications(Common in use)

Communication cable	Home server
0.75mm^2, 2wires	0.75mm^2, 2wires

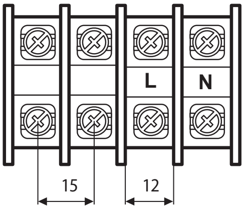
▶ For Indoor Power Cable, use the grade H07RN-F or H05RN-F materials.



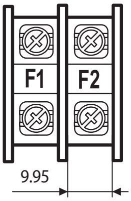
When installing the indoor unit in a computer room or network room, use the double shielded (Tape aluminum / polyester braid + copper) cable of FROHH2R type.

1-phase terminal block spec

AC power : M5 screw

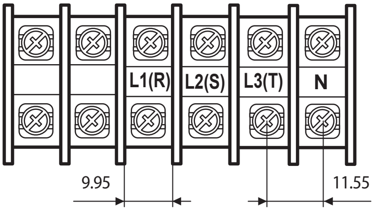


Communication : M4 screw

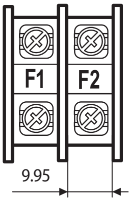


3-phase terminal block spec

AC power : M4 screw

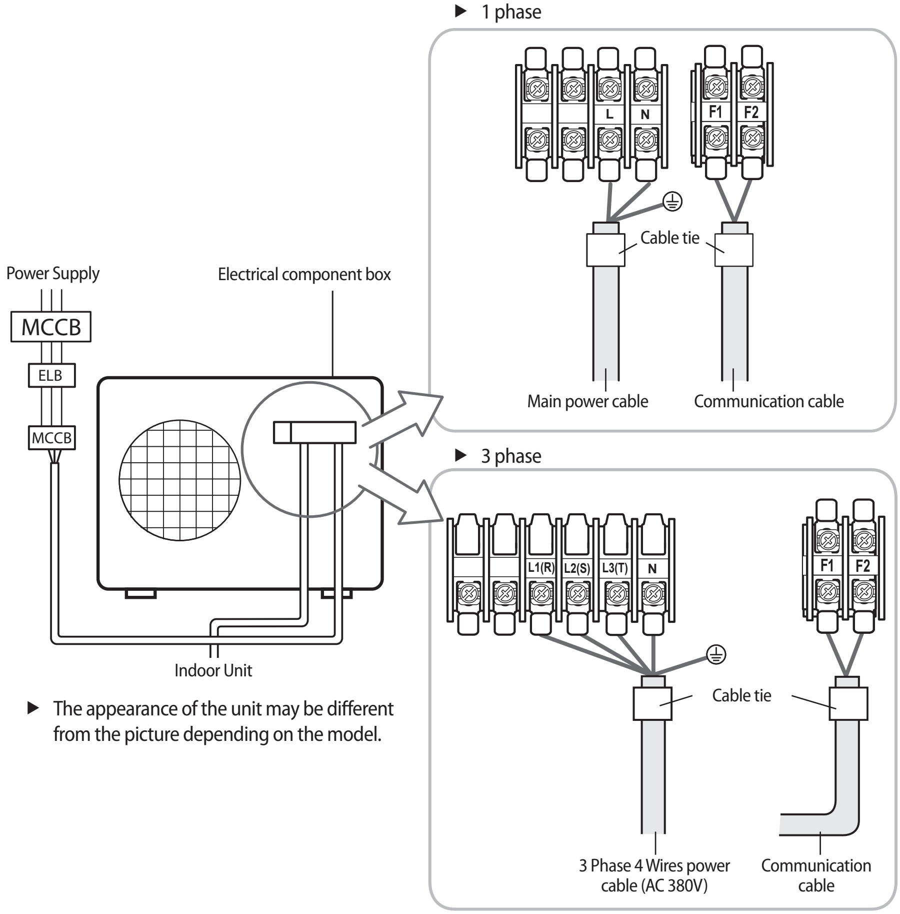


Communication : M4 screw



Wiring diagram of power cable

When using ELB for 1 phase and 3 phase


▶ 1 phase
L
N
F1
F2
Cable tie
Main power cable
Communication cable
▶ 3 phase
L1(R)
L2(S)
L3(T)
N
F1
F2
Cable tie
3 Phase 4 Wires power cable (AC 380V)
Communication cable
Power Supply
Electrical component box
MCCB
ELB
MCCB
Indoor Unit

▶ The appearance of the unit may be different from the picture depending on the model.

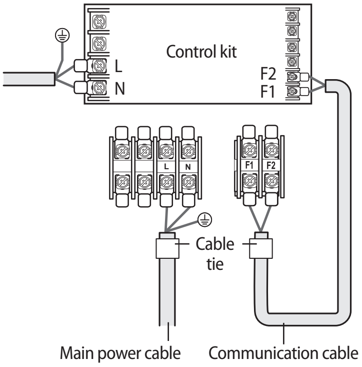
CAUTION

- You should connect the power cable into the power cable terminal and fasten it with a clamp.
- The unbalanced power must be maintained within 2% of supply rating.
  - If the power is unbalanced greatly, it may shorten the life of the condenser. If the unbalanced power is exceeded over 4% of supply rating, the indoor unit is protected, stopped and the error mode indicates.
- To protect the product from water and possible shock, you should keep the power cable and the connection cord of the indoor and outdoor units within ducts. (with appropriate IP rating and material selection for your application)
- Ensure that main supply connection is made through a switch that disconnects all poles, with contact gap of a least 3 mm.
- Devices disconnected from the power supply should be completely disconnected in the condition of overvoltage category.
- Keep distances of 50mm or more between power cable and communication cable.

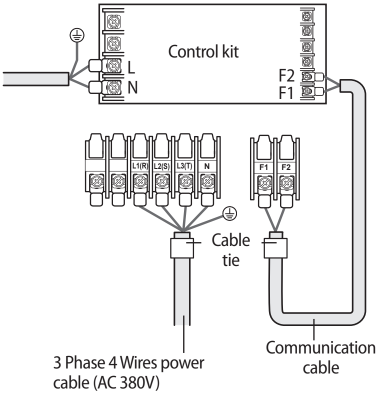
Wiring

Wiring diagram of connection cord

1 phase


Control kit
L
N
F2
F1
L
N
F1
F2
Cable tie
Main power cable
Communication cable

3 phase

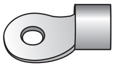

Control kit
L
N
F2
F1
L1(R)
L2(S)
L3(T)
N
F1
F2
Cable tie
3 Phase 4 Wires power cable (AC 380V)
Communication cable

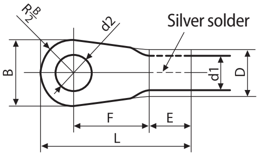
NOTE

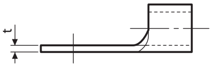
- Lay the electrical wiring so that the front cover does not rise up when doing wiring work and attach the front cover securely.
- Ground wire for the indoor unit and outdoor unit connection cable must be clamped to a soft copper tin-plated eyelet terminal with M4 screw hole (NOT SUPPLIED WITH UNIT ACCESSORIES).

Connecting the power terminal

- ▶ Connect the cables to the terminal board using the compressed ring terminal.
- ▶ Cover a solderless ring terminal and a connector part of the power cable and then connect it.




R B/2
d2
Silver solder
B
d1
D
F
E
L



Nominal dimensions for cable [mm²(inch)]		4/6 (0.006/0.009)		10 (0.01)	16 (0.02)	25 (0.03)		35 (0.05)		50 (0.07)	70 (0.10)
Nominal dimensions for screw [mm(inch)]		4 (3/8)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)		8 (3/16)		8 (3/16)	8 (3/16)
B	**Standard dimension [mm(inch)]**	9.5 (3/8)	15 (9/16)	15 (9/16)	16 (10/16)	12 (1/2)	16.5 (10/16)	16 (10/16)	22 (7/8)	22 (7/8)	24 (1)
	Allowance [mm(inch)]	±0.2 (±0.007)		±0.2 (±0.007)	±0.2 (±0.007)	±0.3 (±0.011)		±0.3 (±0.011)		±0.3 (±0.011)	±0.4 (±0.011)
D	**Standard dimension [mm(inch)]**	5.6 (1/4)		7.1 (1/4)	9 (3/8)	11.5 (7/16)		13.3 (1/2)		13.5 (1/2)	17.5 (11/16)
	Allowance [mm(inch)]	+0.3 (+0.011) -0.2 (-0.007)		+0.3 (+0.011) -0.2 (-0.007)	+0.3 (+0.011) -0.2 (-0.007)	+0.5 (+0.019) -0.2 (-0.007)		+0.5 (+0.019) -0.2 (-0.007)		+0.5 (+0.019) -0.2 (-0.007)	+0.5 (+0.019) -0.4 (-0.015)
d1	**Standard dimension [mm(inch)]**	3.4 (1/8)		4.5 (3/16)	5.8 (1/4)	7.7 (5/16)		9.4 (3/8)		11.4 (7/16)	13.3 (1/2)
	Allowance [mm(inch)]	±0.2 (±0.007)		±0.2 (±0.007)	±0.2 (±0.007)	±0.2 (±0.007)		±0.2 (±0.007)		+0.3 (+0.011) -0.2 (-0.007)	±0.4 (±0.015)
E	**Min. [mm(inch)]**	6 (1/4)		7.9 (5/16)	9.5 (5/16)	11 (3/8)		12.5 (1/2)		17.5 (11/16)	18.5 (3/4)
F	**Min. [mm(inch)]**	5 (3/16)	9 (3/8)	9 (3/8)	13 (1/2)	15 (5/8)	13 (1/2)	13 (1/2)		14 (9/16)	20 (3/4)
L	**Max. [mm(inch)]**	20 (3/4)	28.5 (1-1/8)	30 (1-3/16)	33 (1-5/16)	34 (1-3/8)		38 (1-1/2)	43 (1-11/16)	50 (2)	51 (2)
d2	**Standard dimension [mm(inch)]**	4.3 (3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)		8.4 (1-3/16)		8.4 (1-3/16)	8.4 (1-3/16)
	Allowance [mm(inch)]	+ 0.2 (+0.007) 0(0)	+0.4 (+0.015) 0(0)	+0.4 (+0.015) 0(0)	+0.4 (+0.015) 0(0)	+0.4 (+0.015) 0(0)		+0.4 (+0.015) 0(0)		+0.4 (+0.015) 0(0)	+0.4 (+0.015) 0(0)
t	**Min. [mm(inch)]**	0.9 (0.03)		1.15 (0.04)	1.45 (0.05)	1.7 (0.06)		1.8 (0.07)		1.8 (0.07)	2.0 (0.078)

- ▶ Connect the rated cables only.
- ▶ Connect using a driver which is able to apply the rated torque to the screws.
- ▶ If the terminal is loose, fire may occur caused by arc. If the terminal is connected too firmly, the terminal may be damaged.

Tightening Torque (kgf • cm)		
M4	12.0~15.0	Communication : F1, F2 3phase AC power : L1(R), L2(S), L3(T), N
M5	20.0~25.0	1phase AC power : L, N

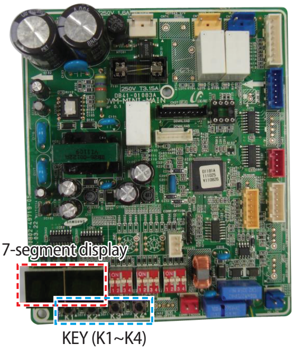
CAUTION

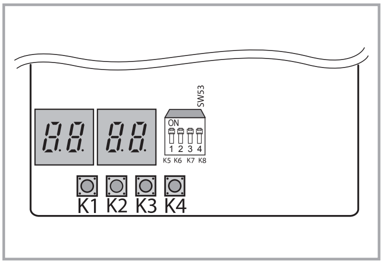
- When connecting cables, you can connect the cables to the electrical part or connect them through the holes below depending on the spot.
- Run transmission wiring between the indoor and outdoor units through a conduit to protect against external forces, and feed the conduit through the wall together with refirgerant piping.
- Remove all burrs at the edge of the knock-out hole and secure the cable to the outdoor knock-out using lining and bushing with an electrical insulation such as rubber and so on.
- Must keep the cable in a protection tube.
- Keep distances of 50mm or more between power cable and communication cable.
- When the cables are connected through the hole, remove the Plate bottom.

Testing operations

1. Check the power supply between the outdoor unit and the auxiliary circuit breaker.
   - 1 phase power supply : L, N
   - 3 phases power supply : R,S,T,N
2. Check the CONTROL KIT
   1) Check that you have connected the power and communication cables correctly. (If the power cable and communication cables one mixed up or connected incorrectly, the PCB will be damaged.)
   2) Check the temp. sensor, drain pump/hose, and display are connected correctly.
3. Press K1 or K2 on the outdoor unit PCB to run the test mode and stop.

KEY	KEY operation	7-segment display
K1	Press once : Heating test run	"t" "1" "BLANK" "BLANK"
	Press twice : Defrost test run	"t" "3" "BLANK" "BLANK"
	Press 3times : Finishing test mode	-
K2	Press once : Cooling test run	"t" "2" "BLANK" "BLANK"
	Press twice : Finishing test mode	-
K3	Reset	
K4	View mode	Refer to View mode display





4. View Mode : When the K4 switch is pressed, you can see information about our system state as below.

Number of press	Display contents	Display				Units
		Segment 1	Segment 2	Segment 3	Segment 4	
0	Communication State	10s digit of Tx	1s digit of Tx	10s digit of Rx	1s digit of Rx	
1	Order frequency	1	100s digit	10s digit	1s digit	Hz
2	Current frequency	2	100s digit	10s digit	1s digit	Hz
3	Type of Outdoor unit (Mono/Split)	3	0	0	0 : split 1 : mono	
4	Outdoor air sensor	4	+ / -	10s digit	1s digit	℃
5	Discharge sensor	5	100s digit	10s digit	1s digit	℃
6	PHE (Eva) sensor	6	+ / -	10s digit	1s digit	℃
7	Cond sensor	7	+ / -	10s digit	1s digit	℃
8	Current	8	10s digit	1s digit	First decimal	A
9	Fan RPM	9	1000s digit	100s digit	10s digit	rpm
10	Target discharge temperature	A	100s digit	10s digit	1s digit	℃
11	EEV	B	1000s digit	100s digit	10s digit	step

Number of press	Display contents	Display				Units
		Segment 1	Segment 2	Segment 3	Segment 4	
12	Not used exchanger capacity	C	0	0	0	kW
13	Protection control	D	0 : air conditioning 1 : heating	Protection control 0 : no protection control 1 : freezing 2 : non-stop defrosting 3 : over-load 4 : discharge	Frequency state 0 : Normal 1 : Hold 2 : Down 3 : Up_limit 4 : Down_limit	-
14	Temperature of Heatsink at PBA	E	100s digit	10s digit	1s digit	℃
15	The Quantity of connected Indoor Unit	F	100s digit	10s digit	1s digit	set
long-1	Main Micom version	Year(Hex)	Month(Hex)	Day(two digit)	Day(One digit)	-
long-1and 1	Inverter Micom version	Year(Hex)	Month(Hex)	Day(two digit)	Day(One digit)	-
long-1and 2	EEPROM version	Year(Hex)	Month(Hex)	Day(two digit)	Day(One digit)	-

5. DIP Switching setting

<table>
<tr><th>KEY</th><th>ON (default)</th><th>OFF</th><th>Remark</th></tr>
<tr><td>K5</td><td>Auto Address
(Outdoor unit recognize the address of indoor unit by random access.)</td><td>Manual Address
(Outdoor unit recognize the address of indoor unit by rotary switch of indoor unit.)</td><td>In Monobloc K5 must be'ON'</td></tr>
<tr><td>K6</td><td>Operating time of base heater is 15min.</td><td>Operating time of base heater is 20min.</td><td>Base heater will operate under 0℃</td></tr>
<tr><td>K7</td><td>Anti-stack snow mode ON</td><td>Anti-stack snow mode OFF</td><td></td></tr>
<tr><td>K8</td><td>Enable base heater</td><td>Disable base heater</td><td></td></tr>
<tr><td>K9</td><td colspan="2" rowspan="2">Silence operation
<table>
<tr><th>K9</th><th>K10</th><th>Mode</th></tr>
<tr><td>ON</td><td>ON</td><td>Disable silence mode</td></tr>
<tr><td>ON</td><td>OFF</td><td>Silence mode Step.1</td></tr>
<tr><td>OFF</td><td>ON</td><td>Silence mode Step.2</td></tr>
<tr><td>OFF</td><td>OFF</td><td>Silence mode Step.3</td></tr>
</table></td><td></td></tr>
<tr><td>K10</td><td></td></tr>
<tr><td>K11</td><td colspan="2">X</td><td>Not defined</td></tr>
<tr><td>K12</td><td colspan="2">X</td><td>Not defined</td></tr>
<tr><td>K13</td><td colspan="2" rowspan="2">Whole current control
<table>
<tr><th>K13</th><th>K14</th><th>Mode</th></tr>
<tr><td>ON</td><td>ON</td><td>Limit total current: 1_Down</td></tr>
<tr><td>ON</td><td>OFF</td><td>Limit total current: 1_Down_OP1</td></tr>
<tr><td>OFF</td><td>ON</td><td>Limit total current: 1_Down_OP2</td></tr>
<tr><td>OFF</td><td>OFF</td><td>Limit total current: 1_Down_OP3</td></tr>
</table></td><td></td></tr>
<tr><td>K14</td><td></td></tr>
<tr><td>K15</td><td colspan="2">X</td><td>Not defined</td></tr>
<tr><td>K16</td><td colspan="2">X</td><td>Not defined</td></tr>
</table>

Trouble shooting

WARNING

- Incorrect handling of thermostat, safety valve or other valves may lead to tank rupture. When servicing the unit follow instructions carefully:
  - Always turn off main power supply when water supply is being shut off.
  - Test the free operation of the safety valve regularly by opening the valve ensuring the water flows freely.
  - Electrical connection and all servicing of the electrical components should only be carried out by an authorized electrician.
  - Fitting and all servicing of plumbing fixtures should only be carried out by an authorized installer.
  - When replacing the thermostat, safety valve or any other valve or part supplied with this unit, use only approved parts of the same specification.

Error codes

If the unit has some problems and does not work normally, error code is shown on the OUTDOOR UNIT main PBA or LCD of the wired remote controller.

Display	Explanation	Error Source
101	CONTROL KIT / OUTDOOR UNIT wire connection error	CONTROL KIT, OUTDOOR UNIT
162	EEPROM Error	CONTROL KIT
201	CONTROL KIT/OUTDOOR UNIT communication error (Matching error)	CONTROL KIT, OUTDOOR UNIT
202	CONTROL KIT/OUTDOOR UNIT communication error (3 min)	CONTROL KIT, OUTDOOR UNIT
203	Communication error between INVERTER and MAIN MICOM (6 min)	OUTDOOR UNIT
221	OUTDOOR UNIT temperature sensor error	OUTDOOR UNIT
231	Condenser temperature sensor error	OUTDOOR UNIT
251	Discharge temperature sensor error	OUTDOOR UNIT
320	OLP sensor error	OUTDOOR UNIT
403	Detection of OUTDOOR UNIT compressor freezing (During cooling operation)	OUTDOOR UNIT
404	Protection of OUTDOOR UNIT when it is overload (during Safety Start, Normal operation state)	OUTDOOR UNIT
416	Discharge of a compressor is overheated	OUTDOOR UNIT
419	OUTDOOR UNIT EEV operation error	OUTDOOR UNIT
425	Power source line missing error (only for 3-phase model)	OUTDOOR UNIT
440	Heating operation blocked (outdoor temperature over 35°C)	OUTDOOR UNIT
441	Cooling operation blocked (outdoor temperature under 9°C)	OUTDOOR UNIT
458	OUTDOOR UNIT fan1 error	OUTDOOR UNIT
461	[Inverter] Compressor startup error	OUTDOOR UNIT
462	[Inverter] Total current error/PFC over current error	OUTDOOR UNIT
463	OLP is overheated	OUTDOOR UNIT

Display	Explanation	Error Source
464	[Inverter] IPM over current error	OUTDOOR UNIT
465	Compressor V limit error	OUTDOOR UNIT
466	DC LINK over/low voltage error	OUTDOOR UNIT
467	[Inverter] Compressor rotation error	OUTDOOR UNIT
468	[Inverter] Current sensor error	OUTDOOR UNIT
469	[Inverter] DC LINK voltage sensor error	OUTDOOR UNIT
470	EEPROM read/write error	OUTDOOR UNIT
471	[Inverter] OTP error	OUTDOOR UNIT
474	IPM(IGBT Module) or PFCM temperature sensor Error	OUTDOOR UNIT
475	OUTDOOR UNIT fan2 error	OUTDOOR UNIT
484	PFC Overload Error	OUTDOOR UNIT
485	Input current sensor error	OUTDOOR UNIT
500	IPM is overheated	OUTDOOR UNIT
554	Gas leak error	OUTDOOR UNIT
601	Communication error between the CONTROL KIT and wired remote controller	Wired Remote Controller
602	Wired remote controller Master/Slave setting error	Wired Remote Controller
604	Communication tracking error between the CONTROL KIT and wired remote controller	CONTROL KIT, Wired Remote Controller
607	Communication error between the Master and Salve wired remote controllers	Wired Remote Controller
901	Water inlet (PHE) temperature sensor error(open/short)	OUTDOOR UNIT
902	Water outlet (PHE) temperature sensor error(open/short)	OUTDOOR UNIT
903	Water outlet (backup heater) temperature sensor error.	CONTROL KIT
904	DHW tank temperature sensor error	CONTROL KIT
906	Refrigerant gas inlet (PHE) temperature sensor (open/short)	OUTDOOR UNIT
911	Flow switch and water pump error (F/S signal is OFF for 10 sec. during the water pump signal is ON)	CONTROL KIT
912	Flow switch and water pump error (Water pump signal is OFF for 60sec during the F/S signal is ON)	CONTROL KIT

Maintenance

Listed checks and inspections shall be implemented regularly so that the unit can operate as design intention in production site.

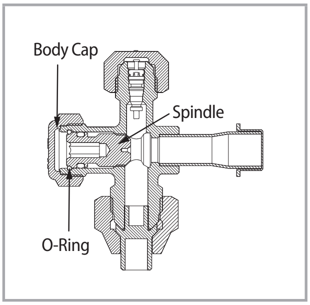
Always switch off the unit and remove power cable from the electric source before carrying out any maintenance or repair works.

Mentioned actions shall be carried out at least once a year by qualified personnel.

1. Water pressure
   - Check if the water pressure is above 0.3 bar. If necessary, supplement water.
2. Water filter
   - Use water filter which is available for cleaning and clean it regularly.
3. Water pressure relief valve
   - Check for correct operation of the pressure relief valve.
   - The valve will work over the designated pressure.
   - If there is leakage of water or water splashed in normal condition, please contact your local installer.
4. Glycol
   - Record and check the glycol concentration and the pH-value in the system at least once a year.
   - A Ph-valve below 8.0 indicates that a significant portion of the inhibitor has been depleted and that more inhibitor needs to be added.
   - When the Ph-value is below 7.0 then oxidation of the glycol occurred, the system should be drained and flushed thoroughly before severe damage occurs.
   - Make sure that the disposal of the glycol solution is done in accordance with relevant local and national regulation.

Using service valve

To open the service valve



1. Open the cap and turn the stop valve counterclockwise by using a hexagonal wrench.
2. Turn it until the axis is stopped.

NOTE

- Do not apply excessive force to the stop valve and always use special instruments. Otherwise, the stopping box can be damaged and the back sheet can leaks.
- If the watertight sheet leaks, turn the axis back by half, tighten the stopping box, then check the leakage again. If there is no leakage any more, tighten the axis entirely.

3. Tighten the cap securely.

To close the service valve

1. Remove the cap.
2. Turn the stop valve clockwise by using a hexagonal wrench.
3. Tighten the axis until the valve reached the sealing point.
4. Tighten the cap securely.

CAUTION

- When you use the service port, always use a charging hose, too.
- Check the leakage of refrigerant gas after tightening the cap.
- Must use a spanner and wrench when you open/tighten the service valve.

Adding refrigerant

The Heat Pump unit is provided to users with basic amounts of refrigerants as initial setting values. While using the unit or doing refrigerant piping works, there can be some loss of refrigerants compared to initial amounts. To run the units properly, keep the amount of refrigerant which SAMSUNG designated.

Procedures as below is describing how to adding the amount of refrigerant.

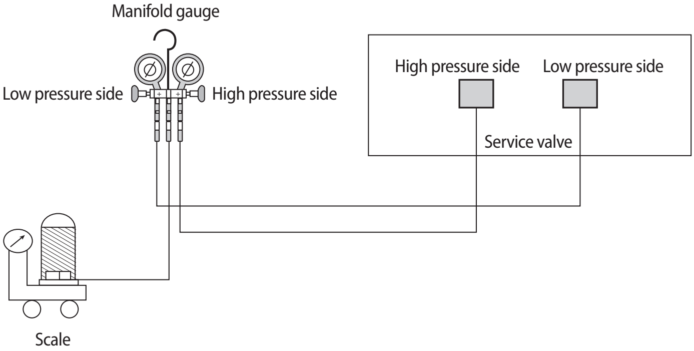
WARNING

- R410A Shall be added as liquid phase.
- Adding and recharging works shall be by Service valves.

1. Connect the manifold gauge and purge the manifold gauge.
2. Open the manifold gauge valve of the liquid side service valve and add the liquid refrigerant.
3. If you cannot fully recharge the additional refrigerant while the outdoor unit is stopped, use the key on PCB in the Heat Pump to run for recharging the remaining refrigerant.

Adding refrigerants in running condition

1. Press the function key for adding refrigerant.
2. After 30 minutes of operation, open the service valve on low pressure side in Heat Pump.
3. Open the valve for low pressure side in the manifold gauge to recharge the remaining refrigerant.
4. After completing, close the valves in manifold gauge and eliminate the hoses from service valves.



Important information regulation regarding the refrigerant used

CAUTION

- Inform user if system contains 3 kg or more of fluorinated greenhouse gases. In this case, it has to be checked for leakage at least once every 12 months, according to regulation n°842/2006. This activity has to be covered by qualified personnel only. In case situation above (3 kg or more of R-410A), installer (or recognised person which has responsability for final check) has to provide a maintenance book, with all the information recorded according to REGULATION(EC) N° 842/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on certain fluorinated greenhouse gases.

Cylinder unit

Safety information

(Before installing a cylinder unit, please read this manual thoroughly to ensure that you know how to safely and efficiently install a new appliance.)

WARNING • If you don't follow the safety precautions, you may get the risk of serious wound or death.

- The installation must be done by the manufacturer or its service agent or a qualified person in order to avoid a hazard.
  - Installation by an unqualified person may cause a water leakage, electric shock or fire and so on.
- The electric work must be done by service agent or qualified persons according to national wiring regulations and use only rated cable.
  - Use certified power cable in the market suggested here and do electric work according to installation manual otherwise, electric shock or fire may occur.
- Install the outdoor unit correctly according to the installation manual.
  - An incorrect installation may cause a water leakage, electric shock or fire and so on.
- Manufacturer is not responsible for accidents due to incorrect installation.
- Use certified parts in the market and supplied parts from the factory.
  - All wiring, components and materials to be procured on the site must comply with the applicable local and national codes. If you don't use the certified parts and tools, it can cause trouble to the air conditioner and bring into injury.
- Install the cylinder unit on a hard and even place that can support its weight.
  - If the place cannot support its weight, the outdoor unit may fall down and it may cause injury.
- Fix the outdoor unit securely on foundation as it can fall over strong wind or earthquake.
  - If the outdoor unit is not properly fixed, it turns over and accidents may occur.
- Secure power cable with a conduit, which is accessory part for cylinder unit, not to be pulled out by external force.
  - If fixing is incomplete, it can cause trouble with a heat generation, electric shock or fire and so on.
- The disinfection function field settings must be configured by the installer according to local laws and regulations.
- Attach the service cover to the cylinder unit and outdoor unit securely without any gaps. If there are any gaps, there is potential risk of fire or electric shock due to dust or water.
- Make sure to earth the unit. Do not connect the earth wire to the gas pipe or water pipe, lighting rod, surge absorber, or telephone earth wire. If earthing is not complete, It may cause an electric shock or fire.
- The water heater should be fitted level on a hard surface with sufficient load strength to take the full weight of the cylinder. Adjustable feet are fitted to ensure the unit can be adjusted to a level position. There is no limitations regarding the fitting distance from walls etc., but it is strongly recommended to ensure easy access to all pipe fittings etc. There should be at least 80 cm of free space in front of the water heater to ensure easy access for servicing and maintenance.
- If the water heater is in danger of being exposed to frost while not operating under electric power, the unit must be drained to avoid damage. Make sure the electric power is turned off before draining, otherwise the heating elements can be damaged and the warranty is void. Draining instructions, see "Commissioning"

General information

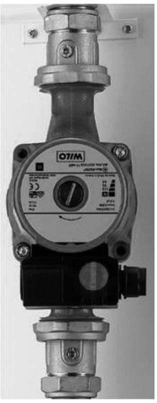
- SAMSUNG Eco Heating system with cylinder unit is designed to withstand SAMSUNG durability and reliability requirements. We cannot guarantee neither good operation nor reliability of total system with other brand tanks.
- The piping, valves and system configuration of cylinder unit should be followed a relevant local or national regulations.
- A pressure relief valve in accordance with an opening pressure of max. 0.9MPa should be connected.
- The electrical box must be opened by a licensed electrician.
- Switch off the power supply before opening the electrical box lid.
- Make sure that the installation location of cylinder unit including piping and valves is frost free.
- Please leave this manual with the end user after installation
- All cylinders are manufactured in accordance with the requirements of BS EN 12897. The tundish must be positioned so that it is visible to the occupant and is away from electrical devices.

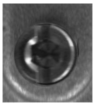
Heat pump system application

- The Cylinder is an unvented hot water storage cylinder fitted with a high efficiency internal primary heat exchanger especially designed for use with heat pump systems.
- All Cylinder models are fitted with 3kW (240Vac, 50Hz) immersion heater for raising the temperature of the stored water to about 60°C after the heat pump heating cycle if necessary.
- Heat pumps can normally only heat the domestic hot water to between 45 – 55°C, therefore provision should be made to periodically heat the cylinder to about 65°C to prevent growth of legionella.

CAUTION

- Cylinder unit shall be located and installed indoors (garage, multipurpose room, boiler room).
- Always ensure that the ambient temperature around unit have to be above 0°C around the year.
- If the unit and the pipes are exposed to freezing temperature, It can cause damage to the hydraulic system. Special care must be taken to prevent freezing of the total water system.
- If the unit stops for a long time because of a power supply failure, pump operating failure, or winter vacation, drain all water from the system.
- Cylinder unit shall be always full of water. Check that water is fully filled with water by opening the pressure relief valve. Air present in the water system may cause malfunction or fire.
- Water quality must be according to EN directive 98/83 EC.
- Make certain that back flow preventer (check valves) must be installed on main supply line to prevent from contaminating the city water. It is recommended to install the make-up water assembly to prevent from contaminating the city water. Check valves in the make-up water assembly can prevent running water inside hydro unit from contaminating water supplies during installation or maintenance works.
- Before running the cylinder unit, check if valves are opened for inlet and outlet port of water pumps. And make sure to have direction of valve slot be straight in horizontal.

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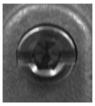
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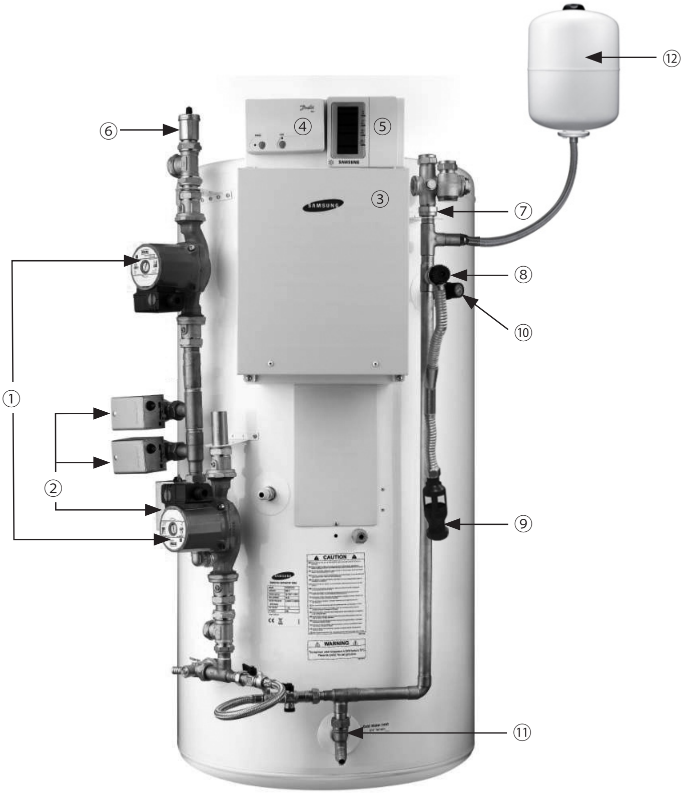
Cylinder unit

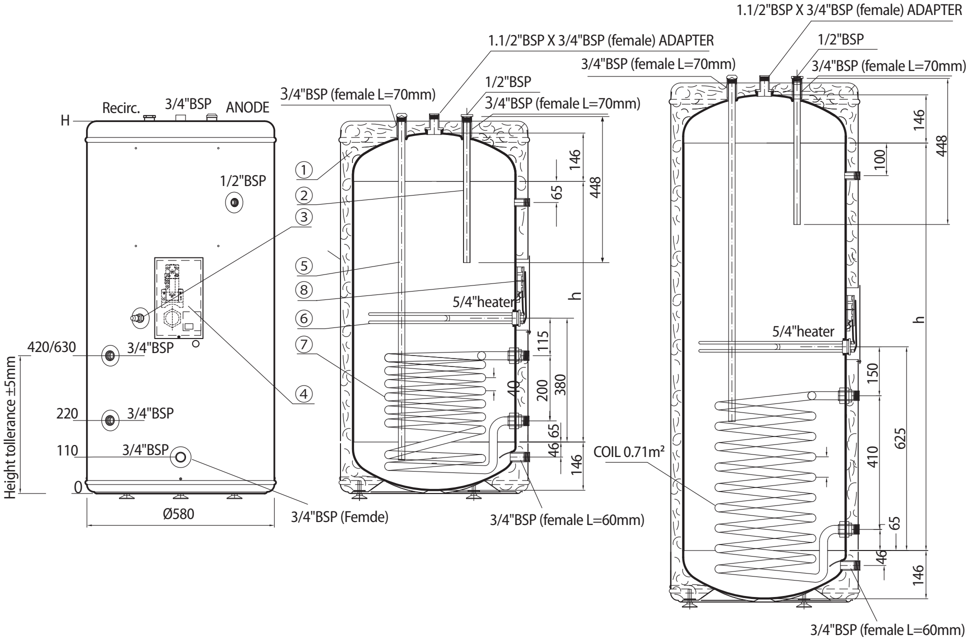
Main components and check list



	No.	Part	Qty	
Installed	1	Water pump	2	Wilo
	2	Motorized 2 Way valve	2	Honeywell V4043
	3	Control kit	1	Samsung
	4	RF Receiver	1	RX1
	5	Wired remote controller	1	Samsung
	6	Air vent	1	
	7	Combination valve	1	
	8	Expansion relief valve	1	
	9	Tundish	1	Ø15 x Ø22 mm
	10	Temperature and pressure relief valve	1	
	11	Drain-cock	2	
Packaged	12	Expansion Tank	1	
	-	Wireless Thermostat	1	Danfoss TP5000 Si RF
	-	Flow Switch (16 lpm)	1	Sika

▶ 2 motorized valves are installed in the cylinder as factory specifications. Those parts enable the cylinder to achieve zone control.

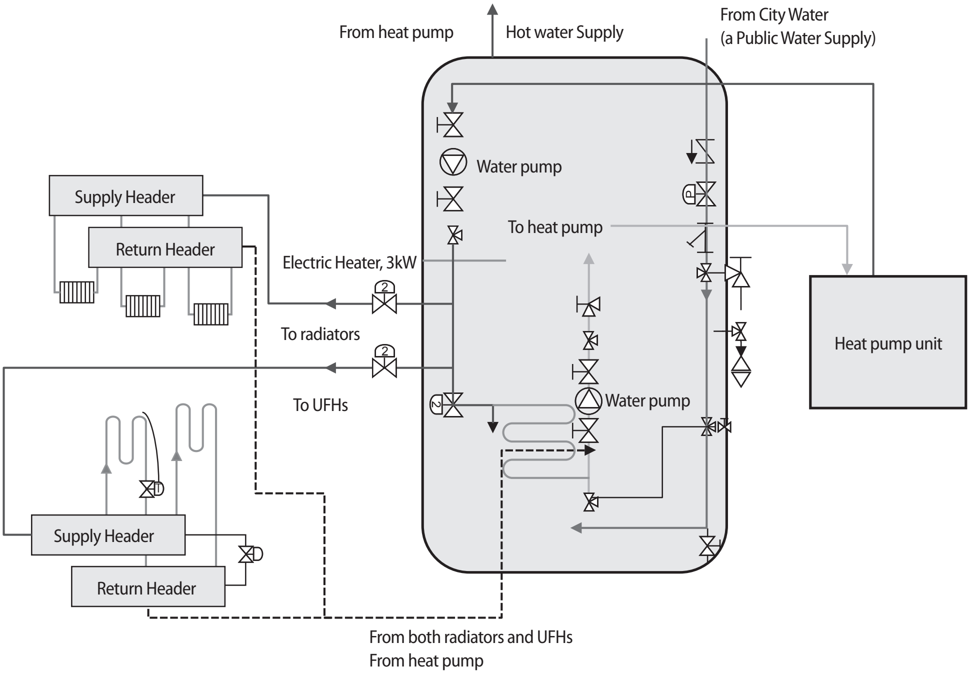
Detailed views


1.1/2"BSP X 3/4"BSP (female) ADAPTER
1.1/2"BSP X 3/4"BSP (female) ADAPTER
1/2"BSP
3/4"BSP (female L=70mm)
3/4"BSP (female L=70mm)
1/2"BSP
3/4"BSP (female L=70mm)
3/4"BSP (female L=70mm)
Recirc.
3/4"BSP
ANODE
H
1/2"BSP
420/630
3/4"BSP
220
3/4"BSP
110
3/4"BSP
0
Height tollerance ±5mm
Ø580
3/4"BSP (Femde)
①
②
③
⑤
⑧
⑥
⑦
④
5/4"heater
146
65
448
h
115
200
380
40
65
46
146
COIL 0.71m²
3/4"BSP (female L=60mm)
146
448
100
5/4"heater
h
150
625
410
65
46
146
3/4"BSP (female L=60mm)

No.	Part
1	Insulation
2	Recirculation tube
3	Thermistor pocket
4	Electric box
5	Anode
6	Heater element
7	Coil
8	Thermostat

Cylinder unit

Flow diagram


From heat pump
Hot water Supply
From City Water
(a Public Water Supply)
Water pump
Supply Header
Return Header
To heat pump
Electric Heater, 3kW
2
To radiators
2
Heat pump unit
To UFHs
Water pump
Supply Header
Return Header
From both radiators and UFHs
From heat pump

Water tank specifications

Detailed information for the DHW Tank are described in the following table.

Description			Unit	Standard	
				NH200CHXEA	NH300CHXEA
Pressure vessel	Material quality		-	AISI 444 / DIN 1.4521	
	Volume capacity		ℓ	192	279
Electric element	Capacity		kW	3	
	Material		-	INCOLOY 825	
	Voltage		V/Hz	1P, 240~, 50Hz	
Heating coil	Material quality		-	Duplex LDX 2101	
	Heating area		m²	0.8	
Insulation	Material quality		-	Polyurethane form	
	Thickness		mm	40	
Insulation jacket	Material quality		-	Epoxy-coated mild steel – white	
	Heat loss		kW/24H	1.9	2.3
	Pressure reducing valve		Bar	3.0	3.0
	Expansion vessel	Size	Liter	12	19
		Pre-charge	Bar	2.1	2.1
Electric heater& thermostat	Capacity		kW	3.0	3.0
	Material		-	Incoloy 825	Incoloy 825
	Voltage		V/Hz	240V/50Hz	240V/50Hz
	Thermostat #1 (AUTO), Requisite		℃	40-70 (60 preset)	40-70 (60 preset)
	Thermostat #2 (MANUAL), Requisite		℃	85	85
Heating coil for heat pump	Material quality		-	1.4162	1.4162
	Heating area		m²	0.8	0.8
Combination valve	Model name		-	SOLE 604	SOLE 604
	Pressure reducing valve		bar	3	3
	Connection size		-	Ø22 mm	Ø22 mm
Expansion relief valve	Model name		-	SOLE 381	SOLE 381
	Relief pressure		bar	8	8
Tundish	Connection size		Inch	Ø15 x Ø22 mm compression fitting	Ø15 x Ø22 mm compression fitting
Motorized zone control valves	Model name		-	Honeywell V4043	Honeywell V4043
	Type		-	230V/50Hz	230V/50Hz
	Connection size		mm	Ø22	Ø22
Temperature & Pressure relief valve	Model name		Inch	Reliance PTEM 550 853	Reliance PTEM 550 853
	Relief pressure		bar	10	10
	Relief temperature		℃	90-95	90-95
	Connection size		-	1/2" x 15 mm	1/2" x 15 mm
Primary heating power			kW	18.0	15.7
Primary flow rate			lpm	15	15

Cylinder unit

Description		Unit	Standard	
			NH200CHXEA	NH300CHXEA
Dimensions	Vessel	mm	585 x 1130	585 x 1580
	Net	mm	692 x 702 x 1200	692 x 702 x 1600
	Packing	mm	800 x 900 x 1600	800 x 900 x 2050
Connections	Cold water inlet(city water)	mm	ø22mm pipe	ø22mm pipe
	Flow from Heat Pump	mm	ø28mm pipe	ø28mm pipe
	Return to Heat Pump	mm	ø28mm pipe	ø28mm pipe
	Sensor pocket(s)	mm	ø8.05 mm inside, 1/2" thread	
Weight	Weight empty	kg	68	80
	Max weight full	kg	260	359
Max. Water temperature		℃	70	
Hot water capacity BS EN 12897 (60℃)		ℓ	184	229
Heating times BS EN 12897 (15~60℃)		min	31.68	45
Heating power of coil BS EN 12897		kW	18.0	15.7
Other	Packaging	-	Eco Foam - PUF	
	Adjustable legs	pcs	3	

Model	max design pressure	Operating pressure CW feed & coil	Pressure drop primary heater	Temp./pressure relief valve	Safety valve Pressure/ conn.	Exp. Vessel capacity
NH200CHXEA	8 bar	cw in 3bar, coil 2.5bar	0,03bar	90-95℃/ 10bar	8bar/ 15mm - 1/2"	12 L
NH300CHXEA	8 bar	cw in 3bar, coil 2.5bar	0,03bar	90-95℃/ 10bar	8bar/ 15mm - 1/2"	18 L

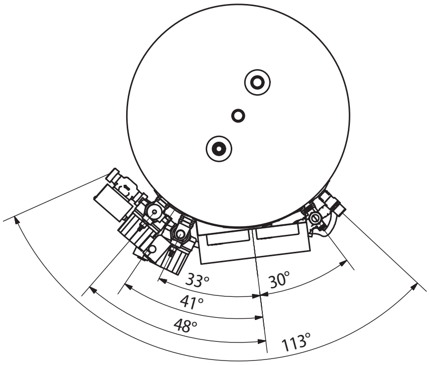
Temperature rise is from 15 to 60℃. Coil heating performance based on a primary flow rate of 15 l/min. at 80℃. (EN12897)

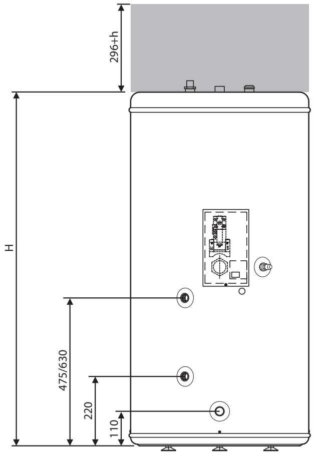
Space requirements

Positions of water inlet and outlet pipe are affected by the layout of cylinder unit. The layout of pipes and other components except cylinder unit are the responsibility of installers. The cylinder unit must be laid out in accordance with the illustrations as below to prevent any water leakage and malfunction.

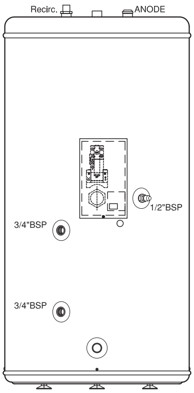
▶ Observe the clearances and dimensions as seen below during installing the water tank.

> **NOTE**
> - The installation space mentioned above is minimum suggested clearance.
> - To secure enough service space and performance of system, take account of more sufficient space.
> - Be sure to install unit in a place strong enough to withstand its weight.
>   [Total weight 365 kg, Tank(65 kg), Water(300 kg)]





Volume	H	h
200	1130	800
300	1580	1250



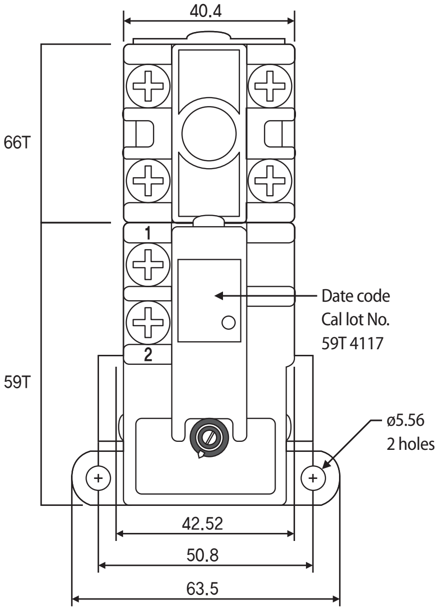
Cylinder unit

Wiring diagram

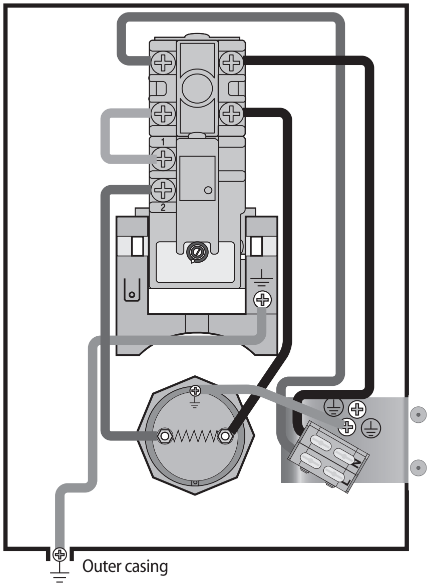
CAUTION
- Turn on the cylinder unit and outdoor unit after completing electric wiring works.
- Do not disassemble the wirings out of the unit while the unit is operating.
- Circuit breaker shall be installed for safety and maintenance .
- Fill the cylinder unit with water before turning on electric power.

▶ Make sure of an earthing.

- Do not connect the earth wire to the gas pipe, water pipe, lighting rod or telephone wire. If earthing is incomplete, electric shock or fire may occur.



Wiring diagram



Electrical connections – Technical Data:

Electric element	2.6 kW 230V 1 phase, 1 1/4" connection with O-ring seal
Adjustable	Electric output can be reduced by cutting one bridge on the element.
Thermostat	40~70°C (preset 60°C)
Safety cut-off	85°C
Electric central	Internally connected from factory. Splash proof IP21.

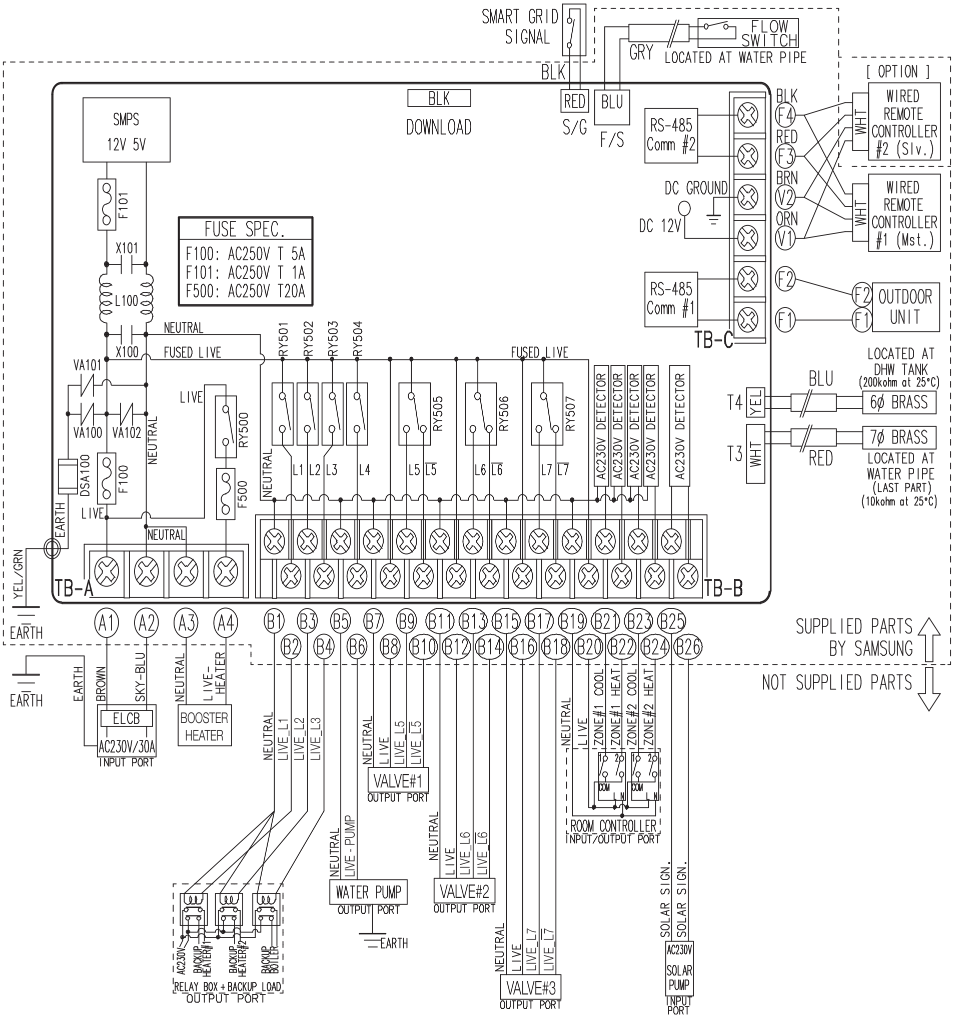
Electric immersion heater shall comply with EN 60335-2-73

Immersion heater

Cylinder is provided with a single immersion heater located above the heating coil. The element is designed as an auxiliary heater to supplement the energy from the heat pump if this is insufficient to heat the domestic water to the required level.

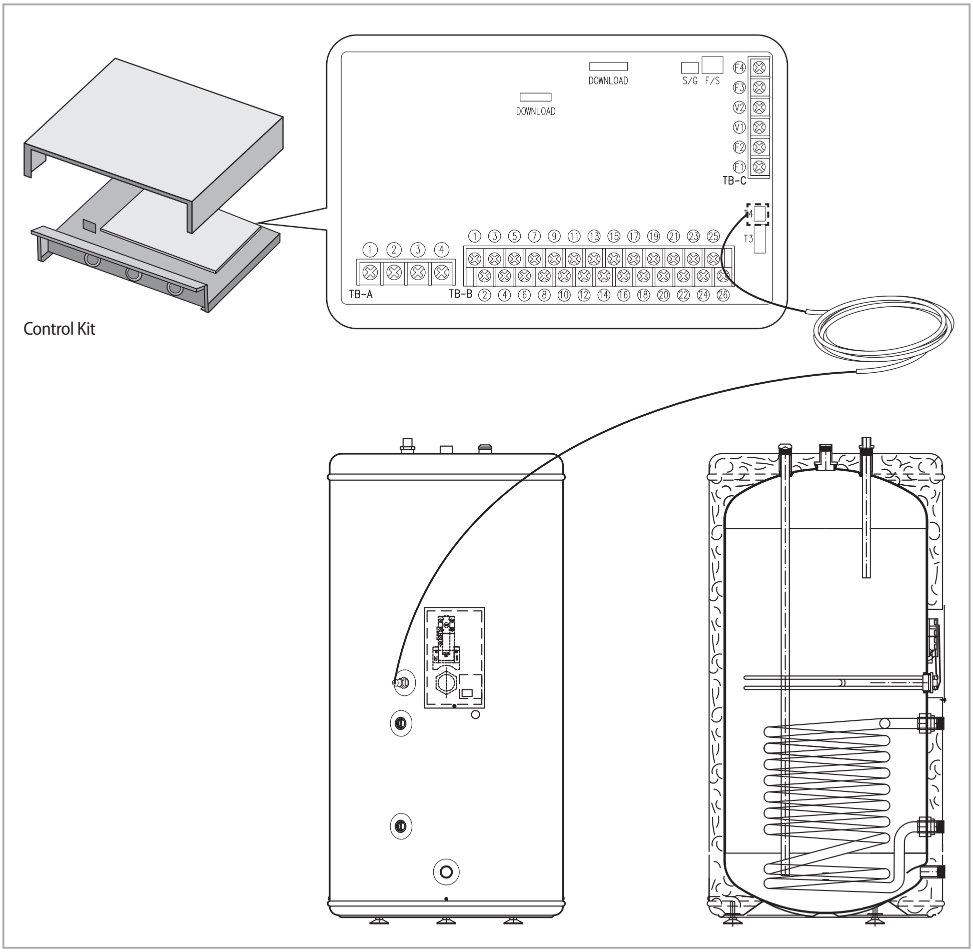
Wiring instructions for the immersion heater is located on the reverse side of the lower lid. Follow the wiring instructions connecting the live, neutral and earth as indicated. The electrical connection to the immersion heater must conform to current IEE wiring regulations. The unit must be permanently connected to the electrical supply through a double-pole linked switch with a minimum break capacity of 13 amps. All internal wiring is factory mounted. Each immersion heater has a working thermostat adjustable between 40℃ - 70℃. A safety cut-out is also incorporated within the thermostat and will operate at 85℃ ± 3℃. Should this happen, press the reset button.

Important: Before resetting the safety cut-out or altering the thermostat setting, isolate electrical supply to the unit prior to removal of the lid. Ensure the lid to the electrical box is replaced correctly and the retaining screw is fitted.


SMART GRID SIGNAL
FLOW SWITCH
GRY LOCATED AT WATER PIPE
BLK
[OPTION]
SMPS 12V 5V
BLK DOWNLOAD
RED S/G
BLU F/S
RS-485 Comm #2
BLK F4
RED F3
BRN V2
ORN V1
WHT
WIRED REMOTE CONTROLLER #2 (Slv.)
WIRED REMOTE CONTROLLER #1 (Mst.)
DC GROUND
DC 12V
F101
X101
L100
FUSE SPEC.
F100: AC250V T 5A
F101: AC250V T 1A
F500: AC250V T20A
RS-485 Comm #1
F2
F1
OUTDOOR UNIT
TB-C
NEUTRAL
FUSED LIVE
X100
VA101
VA100 VA102
RY501 RY502 RY503 RY504
LIVE
RY500
F500
DSA100
F100
EARTH
L1 L2 L3 L4
RY505 L5 L5
RY506 L6 L6
RY507 L7 L7
AC230V DETECTOR
LOCATED AT DHW TANK (200kohm at 25°C)
BLU
T4 YEL
6ϕ BRASS
T3 WHT
RED
7ϕ BRASS
LOCATED AT WATER PIPE (LAST PART) (10kohm at 25°C)
YEL/GRN
TB-A
TB-B
EARTH
A1 A2 A3 A4
B1 B3 B5 B7 B9 B11 B13 B15 B17 B19 B21 B23 B25
B2 B4 B6 B8 B10 B12 B14 B16 B18 B20 B22 B24 B26
SUPPLIED PARTS BY SAMSUNG
NOT SUPPLIED PARTS
BROWN SKY-BLU
ELCB AC230V/30A INPUT PORT
NEUTRAL LIVE-HEATER
BOOSTER HEATER
NEUTRAL LIVE_L1 LIVE_L2 LIVE_L3
NEUTRAL LIVE LIVE_L5 LIVE_L5
VALVE#1 OUTPUT PORT
NEUTRAL LIVE-PUMP
WATER PUMP OUTPUT PORT
NEUTRAL LIVE LIVE_L6 LIVE_L6
VALVE#2 OUTPUT PORT
NEUTRAL LIVE LIVE_L7 LIVE_L7
VALVE#3 OUTPUT PORT
NEUTRAL LIVE ZONE#1 COOL ZONE#1 HEAT ZONE#2 COOL ZONE#2 HEAT
COM L N
ROOM CONTROLLER INPUT/OUTPUT PORT
SOLAR SIGN. SOLAR SIGN.
AC230V SOLAR PUMP INPUT PORT
AC230V BACKUP HEATER#1 BACKUP HEATER#2 BACKUP BOILER
RELAY BOX + BACKUP LOAD OUTPUT PORT

Cylinder unit

Switch box layout


DOWNLOAD
DOWNLOAD
S/G
F/S
F4
F3
V2
V1
F2
F1
TB-C
T4
T3
1 2 3 4
TB-A
1 3 5 7 9 11 13 15 17 19 21 23 25
TB-B
2 4 6 8 10 12 14 16 18 20 22 24 26
Control Kit

Moving the cylinder unit

- Select the moving route in advance.
- Be sure that moving route is safe from weight of the cylinder unit
- Do not slant the product more than 30º when carrying it.

Moving the cylinder unit with a fork lift.

- Insert the fork into the wooden pallet at the bottom of the cylinder unit carefully. Be careful that the fork does not damage the cylinder unit.

Cold water supply

- To obtain the best performance from your Cylinder unvented system it is advisable to feed the unit with an uninterrupted supply. Before connecting , flush the cold supply pipework of all flux and debris.
- Locate the water heater in a suitable position to facilitate the installation of the cold water supply, discharge fittings and pipework. Also take into account access to the immersion heaters and the commissioning valve.
- Flow rates for ALL mains pressure systems are subject to district pressures and system dynamic loss. Particularly on larger properties with more than one bathroom, the pipe sizes should be calculated in accordance with BS6700. Take care not to run the cold pipe near hot water or heating pipe work so that the heat pick up is minimized. Identify the cold water supply pipe and fit an isolating valve (not supplied).
- Do not use "screwdriver slot" or similar valves. Make sure the connection to the cold feed of the cylinder and incorporate a drain valve. Position the inlet control just above the Temperature & Pressure Relief Valve (TPRV) mounted on the side of the cylinder. This ensures that the cylinder does not have to be drained down in order to service the inlet control set. Ensure that the arrow points in the direction of the water flow. Select a suitable position for the expansion vessel. Mount it to the wall using the bracket provided. Use the hose to connect to the inlet control group.

Hot water connection

- Connect the first part of the hot water distribution pipework in 3/4 BSP on the top of cylinder. This can be reduced to 15mm and 10mm as appropriate for the type of tap etc. Your aim should be to reduce the volume of the hot draw off pipework to a practical minimum so that the time taken for the hot water is as quick as possible. Outlets of this type can back pressurize the unit and result in discharge.
- Select a suitable position for the expansion vessel. Mount it to the wall using the bracket provided and connect to the inlet control set with the flexible hose provided. Ensure that the top of the vessel is accessible for servicing.

Primary Coil Connections

- Connect the primary connections using the compression connections to copper pipework.
- Either primary connection may be used as the primary flow.
- If you seal the primary circuit an additional expansion vessel and safety valve is required.
- The normal operating pressure of Primary circuit is under 2.0 bar since additional expansion relief valve of 3 bar should be required for the safety.
- The primary circuit can be open vented or sealed with up to a maximum pressure of 2.5 bar.

Secondary Circulation

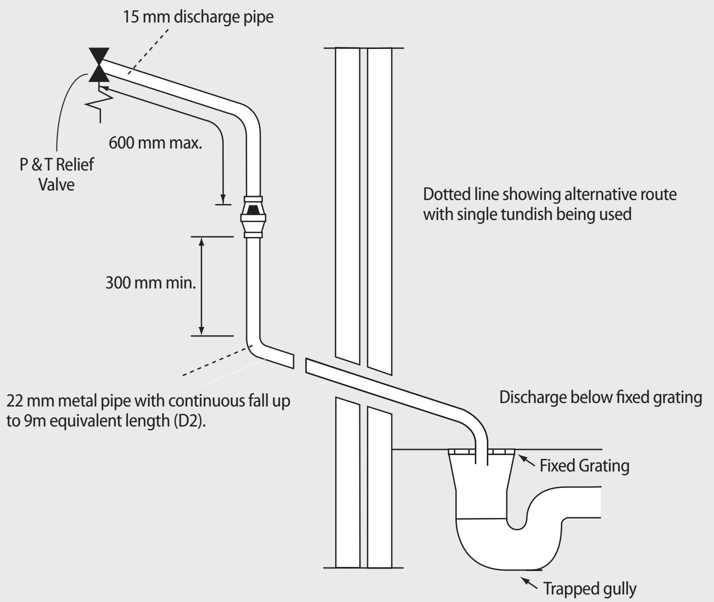
- Cylinder unit can be used with secondary circulation. An appropriate WRAS approved bronze circulator should be used in conjuction with a non-return valve to prevent backflow.
- Secondary circulation system it may be necessary to incorporate an extra expansion vessel into the circuit to accommodate the increased system water volume.
- Secondary circulation should be avoided on direct electrically heated units being used on off peak electricity tariffs.
- Check and tighten all mechanical joints prior to commissioning.
- Cap and seal 2nd heating zone valve outlet if not in use to avoid possible leaks on the product.
- Please note that the maximum operating pressure of the secondary circulation is 3 bar.

Discharge pipe

- Connect the discharge pipe from the tundish. This must have a continuous fall and be fitted in accordance with The Building Regulations . The tundish should be installed away from electrical devices.

Discharge Arrangement

Typical Discharge Pipe Arrangement


15 mm discharge pipe
600 mm max.
P & T Relief Valve
Dotted line showing alternative route with single tundish being used
300 mm min.
22 mm metal pipe with continuous fall up to 9m equivalent length (D2).
Discharge below fixed grating
Fixed Grating
Trapped gully

NOTE

- The discharge will consist of scalding waterand steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges. It is not acceptable to discharge straight into a soil pipe.

The relief valve should be installed to discharge in accordance with G3 of the Approved Document of the Building Regulations and should be piped to where it is visible, but will not cause danger to persons or damage to materials.

The following information is taken from Approved Document G3 of the Building Regulations and is provided to assist with the design and installation of the discharge pipework. However, the information is not exhaustive and reference should always be made to Approved Document G3 of the Building Regulations. The final decision regarding any arrangements rests with Building Control and it is recommended that their advice is sought if you have any concerns regarding this aspect of the installation.

The tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible and within 500mm of the safety device e.g. the temperature relief valve. The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal and:

a Be at least one pipe size larger than the nominal outlet size of the safety devices unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance. Refer to table 1.7 and the worked example below. An alternative approach for sizing discharge pipes would be to follow BS6700 Specification for design and installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

b Have a vertical section of pipe at least 300mm long, below the tundish before any elbows or bends in the pipework.

c Be installed with a continuous fall.

d It is preferable for the discharge to be visible at both the tundish and the final point of discharge but where this is not possible or practically difficult there should be clear visibility at one or other of these locations.

Installation

Examples of acceptable discharge arrangements are:

1. Ideally below the fixed grating and above the water seal in trapped gulley.
2. Downward discharges at a low level: i.e. up to 100mm above the external surfaces such as car parks, hard standings, grassed area etc are acceptable providing that where children play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact whilst maintaining visibility.
3. Discharges at a high level; e.g. in to metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering systems that would collect such discharges (tundish available).
4. Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation can be traced reasonably easily. The single common discharge pipe to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

Worked Example

The example below is for G1/2 temperature relief valve with a discharge pipe (D2) having 4 elbows and length of 7m from the tundish to the point of discharge.

From Table 1: Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from a G1/2 temperature relief valve is: 9m subtract the resistance for 4 x 22mm elbows at 0.8m each = 3.2m.

Therefore the maximum permitted length equates to: 5.8m.

5.8m is less than the actual length of 7m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm pipe (D2) from a G1/2 temperature relief valve equates to: 14m.

As the actual length is 7m, a 28mm (D2) copper pipe will be satisfactory.

Table 1: Sizing of copper discharge pipe 'D2' for a temperature relief valve with a G1/2 outlet size (as supplied)

Size of discharge pipework	Maximum length of straight pipe (no bends or elbows)	Deduct the figure below from the maximum length for each bend or elbow in the discharge pipe
22mm	Up to 9m	0.8mm
28mm	Up to 18m	1mm
35mm	Up to 27m	1.4mm

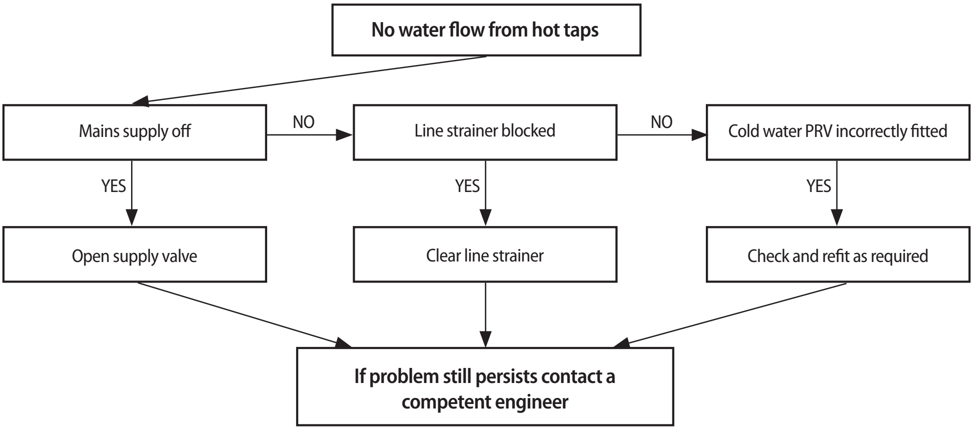
Troubleshooting

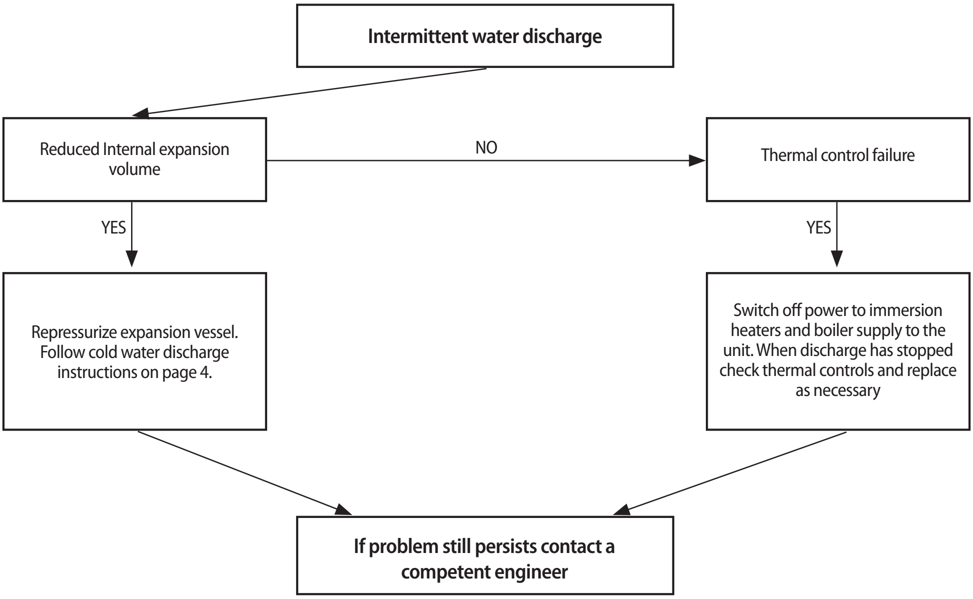
FAULT	POSSIBLE CAUSE	REMEDY
No water flow from hot taps.	1. Mains supply off. 2. Strainer blocked. 3. Cold water inlet Pressure Reducing Valve incorrectly fitted.	1. Check and open stopcock. 2. Turn off water supply. Remove strainer and clean. (See Pressure Reducing Valve page 6 Installation Manual) 3. Check and refit as required (see item 3 page 5 of installation manual).
Water from hot taps is cold.	1. Immersion heaters not switched on. 2. Immersion heater thermal cut-out has operated. 3. Programmer set to central heating or not switched on. 4. Boiler not working 5. Cylinder thermal cut-out has operated. (Indirect units only). 6. Motorised valve not operating correctly.	1. Check and switch on.. 2. Check and reset button. (See thermostat diagram page 9 and safety cut-out on page 4 of installation manual). 3. Check and set to hot water. 4. Check boiler operation. If fault suspected, consult installer or boiler manufacturer. 5. As at No.2 6. Check wiring and/or plumbing connections to motorized valve.
Intermittent water discharge	1. Reduced internal expansion. 2. Thermal control failure. (Note Water will be hot).	1. Repressurize expansion vessel. Follow cold water discharge instructions on page 4. 2. Switch off power to immersion heater(s) and boiler supply to the unit. When discharge has stopped, check thermal controls, replace it faulty. Contact a competent person.
Continuous water discharge	1. Cold water inlet Pressure Reducing Valve not working 2. Temperature and pressure relief valve faulty. 3. Expansion relief valve not working correctly.	1. Check pressure from valve if greater than 2.1 bar replace. (See page 6 of installation manual). 2. As No2 of above. 3. Check and replace if faulty. (See page 6 of installation manual).
Room thermostat does not switch on or not work properly	Wireless room thermostat batteries not Working	Replace new batteries for wireless room thermostat

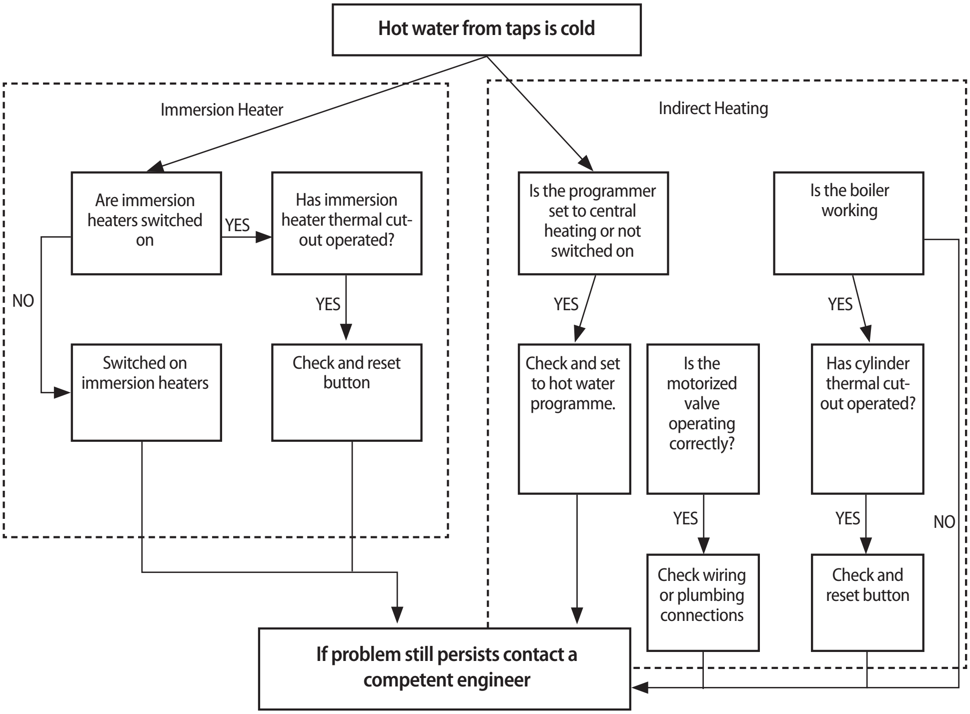
NOTE

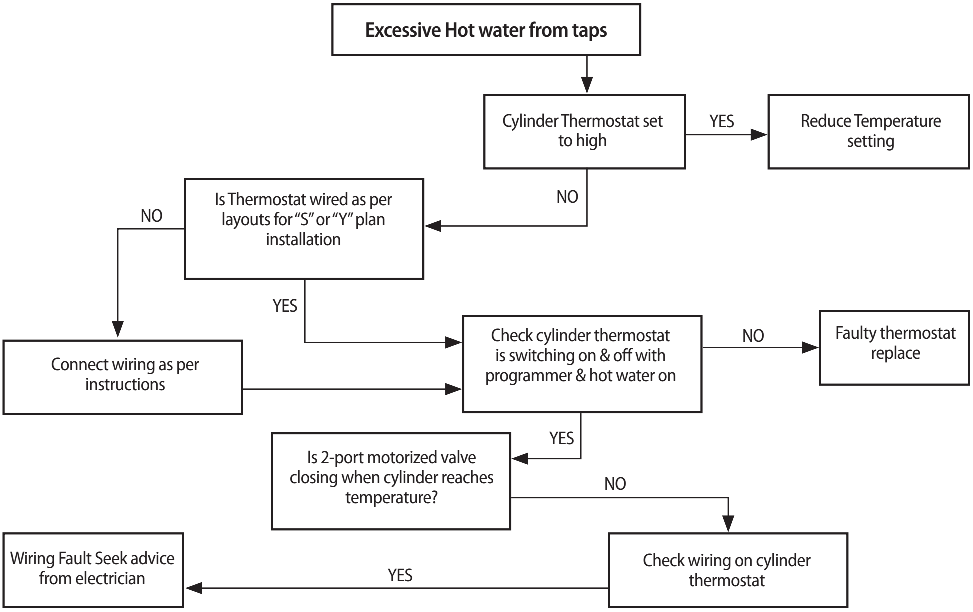
- Disconnect electrical supply before removing any electrical equipment covers.

Troubleshooting


No water flow from hot taps
Mains supply off
NO
Line strainer blocked
NO
Cold water PRV incorrectly fitted
YES
YES
YES
Open supply valve
Clear line strainer
Check and refit as required
If problem still persists contact a competent engineer


Intermittent water discharge
Reduced Internal expansion volume
NO
Thermal control failure
YES
YES
Repressurize expansion vessel. Follow cold water discharge instructions on page 4.
Switch off power to immersion heaters and boiler supply to the unit. When discharge has stopped check thermal controls and replace as necessary
If problem still persists contact a competent engineer


Hot water from taps is cold
Immersion Heater
Indirect Heating
Are immersion heaters switched on
YES
Has immersion heater thermal cut-out operated?
NO
YES
Switched on immersion heaters
Check and reset button
Is the programmer set to central heating or not switched on
Is the boiler working
YES
YES
Check and set to hot water programme.
Is the motorized valve operating correctly?
Has cylinder thermal cut-out operated?
YES
YES
NO
Check wiring or plumbing connections
Check and reset button
If problem still persists contact a competent engineer


Excessive Hot water from taps
Cylinder Thermostat set to high
YES
Reduce Temperature setting
NO
NO
Is Thermostat wired as per layouts for "S" or "Y" plan installation
YES
Connect wiring as per instructions
Check cylinder thermostat is switching on & off with programmer & hot water on
NO
Faulty thermostat replace
YES
Is 2-port motorized valve closing when cylinder reaches temperature?
NO
Wiring Fault Seek advice from electrician
YES
Check wiring on cylinder thermostat

If in doubt at any stage you must consult a qualified technician

Commissioning

Filling up

1. Open a hot tap.
2. Open the cold water supply valve.
3. When water flows from hot tap, close the tap.
4. Allow the system to stabilize for 5 minutes.
5. Open each hot water tap in turn to expel air from the system pipe work.
6. Check for leaks.
7. Manually operate Temperature and Pressure Relief Valve to ensure free water flow through discharge pipe. (Turn knob to left.)

Draining/flushing

1. Turn off mains supply.
2. Connect hose pipe to drain cock at base of cylinder.
3. Open hot tap. Open drain valve and open temperature & pressure relief valve.
4. Allow to drain. Follow commissioning instructions (above) to refill.

Recommissioning instructions

Cold or tepid water discharge from tundish - The tundish should be installed away from electrical devices.

1. Close cold water supply valve.
2. Open a hot tap.
3. Repressurise the expansion vessel air charge to its set level.
4. Close hot tap.
5. pen the cold water supply valve.

Hot water discharge from tundish

This indicates a malfunction of a thermal cut-out, operating thermostat or the combined temperature and pressure relief valve. Turn off the electrical supply to the immersion heater and also isolate an indirect unit from the boiler. Contact the installer or competent engineer.

Maintenance

It is recommended that annually a competent person

a Inspects and cleans the line strainer.

b Checks the operation of the expansion relief valve and temperature & pressure relief valve.

c Recommissions the cylinder in accordance with the instructions.

Corrosion resistance

Duplex stainless steel is naturally corrosion resistant to mains water supply. No specific maintenance is required to maintain this resistance. Please see guarantee terms for permissible water content. Please note: OSO cylinders are not guaranteed for use with a private water supply.

The immersion heater can be removed to provide visual inspection access to the cylinder.

Tundish

Install the Tundish in a vertical position within a maximum of 600mm from the temperature and Pressure Relief Valve drain connection. Ensure the expansion relief pipework discharges through the tundish. Tundish pipework must be 22mm with a minimum vertical length of 300mm below tundish.

Maximum permitted length of 22mm pipework is 9m. Each bend or elbow is equivalent to 0.8m of pipework.

All pipework must have continuous fall and discharge in a safe, visible position. If any doubt, refer to Building Regulation G3.